Assistant Secretary of the Navy for Research Development and Acquisition ASN (RDA)

Software Process Improvement Initiative (SPII)
Human Resources Focus Team

Role-Based Right-Fit Training Technical Report:

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06 November 2007

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1.0 Background

Software complexity is growing exponentially in Department of Defense (DoD) projects (findings of the DoD Software Industrial Base Study, 2007). Software systems are now the leading cost, schedule, and performance driver in the acquisition process for weapons systems (Emmett Paige, 1995). Unfortunately, Navy acquisition personnel are not sufficiently prepared to perform the tasks required by their positions when acquiring software systems.

To address this problem, ASN (RDA) recently commissioned the Software Process Improvement Initiative (SPII). Five focus teams were established as part of the SPII and include:

- Software Acquisition Management,
- Software Systems Engineering,
- Software Development Techniques,
- Business Implications, and
- Human Resources.

The SPII is an opportunity to examine and identify the issues preventing software-intensive projects from meeting schedule, cost, and/or performance goals.

As part of the SPII Initiative, the Software Systems Engineering (SSE) Team conducted a survey of acquisition programs which included software intensive programs of record within NAVAIR, NAVSEA, MARCORSYSCOM, and SPAWAR. Key findings from the SSE survey include*[i]:

- *There is a lack of adequately educated and trained software acquisition professionals and systems engineers – a fact that is recognized by the programs themselves.*
- *There are no established education standards.*
- *Key staff experience levels are below average.*
- *Programs do not have organizational training plans, nor do they even have a syllabus of expected courses for program staff.*
- *There is no systematic identification of training needs across programs and competencies or across the system lifecycles.*
- *There are no strategies developed or resources allocated for training. Training responsibilities of the organization are not determined.*
- *People are trained ad hoc, usually as specific skill needs arise.*

Similarly the Software Acquisition Management (SAM) Team identified:

- *Training does not address program need…*
- *unqualified personnel in leadership, management and decision-making positions…*
- *acquisition personnel are not sufficiently trained or experienced to monitor high capability management or systems/software engineering processes of developers with higher process maturity.*

The SAM Team went on to address the issue of training by stating the need to, *"Provide training in the processes being used by developers to ensure that the product meets the technical and non-technical requirements of the contract…Capture and communicate best practices of successful acquisition organizations."*

1.1 Human Resources Focus Team

The Human Resources (HR) Focus Team was assigned responsibility to address the training issues discovered by the SAM and SSE focus teams and recommend training and education solutions that support SPII principles for each acquisition discipline; (Program Management, Contracting, Acquisition Logistics, Systems & Software Engineering, Test & Evaluation Engineering, and Legal). While training was identified as an issue that needs to be addressed, training will not solve all of the problems in software acquisition. Therefore, the HR Team collaborated with the other four SPII teams for an integrated solution approach.

Charter
SPII Human Resources Focus Team
"Refine the required skills and capabilities needed by government software acquisition and engineering professionals, and to identify a required set of training courses tailored to the respective roles and responsibilities of these professionals.

The proposed training and education focuses on software system acquisition and management that include technical and business expertise needed by engineers and non-engineers. The goal is Role-Based/Right-Fit (RB/RF) training to ensure software acquisition training is targeted to satisfy the specific needs of the six acquisition disciplines. The SPII HR Focus Team identified three broad categories of software acquisition professionals within each acquisition discipline. The three categories are:

- *Software Generalists* – applies to the majority of the acquisition workforce responsible for the management and acquisition of DoD systems. The majority of these systems include varying levels of software, therefore every member of the acquisition workforce should have a basic understanding of software acquisition, software engineering principles, and the fundamentals of open system architecture. Generalists turn to experts and/or "Green Teamers" for more technical guidance.

- *Software Experts* – applies to a small segment of acquisition personnel with an in-depth understanding of software-related terminology, issues, paradigms, etc. Experts are a sub-set of the generalist population. Typically involved in projects deemed critical and software-intensive, experts assume roles that require in-depth software system acquisition and management expertise. Each acquisition discipline will have a group of software experts that serve as the "go-to" people for the majority of software related issues.

- *Green Team Members* – acquisition personnel with a specialized knowledge and skill set in a particular subject or application of software (e.g., software security assurance, simulations, software architectures, etc.). Green Team Members are a sub-set of the expert population. Green Team Members are typically involved in projects deemed critical and software-intensive, and assume roles that require in-depth expertise in a particular software subject or application.

Software generalists, experts, and Green Team Members are found within each of the following six acquisition disciplines:

- Program Management
- Systems and Software Engineering
- Acquisition Logistics
- Contracting
- Legal
- Test & Evaluation Engineering

2.0 Approach

The SPII HR Focus Team emphasized the importance of software acquisition management and engineering by focusing on role-based/right-fit training opportunities, experience, and continuing education units. The approach leverages the DAWIA Certification construct for Levels I, II, and III, and incorporates the DAU Core Plus Framework for the six acquisition disciplines.

2.1 DAWIA Construct

In 1990, Congress adopted the Defense Acquisition Workforce Improvement Act (DAWIA) which created the legal foundation for the central management, planning, and development of today's DoD Acquisition, Technology and Logistics (AT&L) workforce. The purpose of DAWIA is to improve the quality and effectiveness of DoD's acquisition workforce by identifying training, experience and education for specific disciplines. DAWIA established career field certification requirements for 13 functional career paths, and three certification levels (I, II, and III) within each career path.. All acquisition personnel fall under one or more discipline specific certification paths defined by DAWIA. Figure 2-1 illustrates the DAWIA Construct for the five acquisition disciplines. Legal specialists are not a DAWIA recognized career path, however there are significant legal issues in software acquisition such as intellectual property and data rights. Each discipline has different mandatory training, education, and experience requirements for Levels I, II, and III certification. In addition, all

career fields are required 80 hours of Continuing Education Units (CEU) every two years to maintain their DAWIA Certification status.

DAWIA Certification Construct

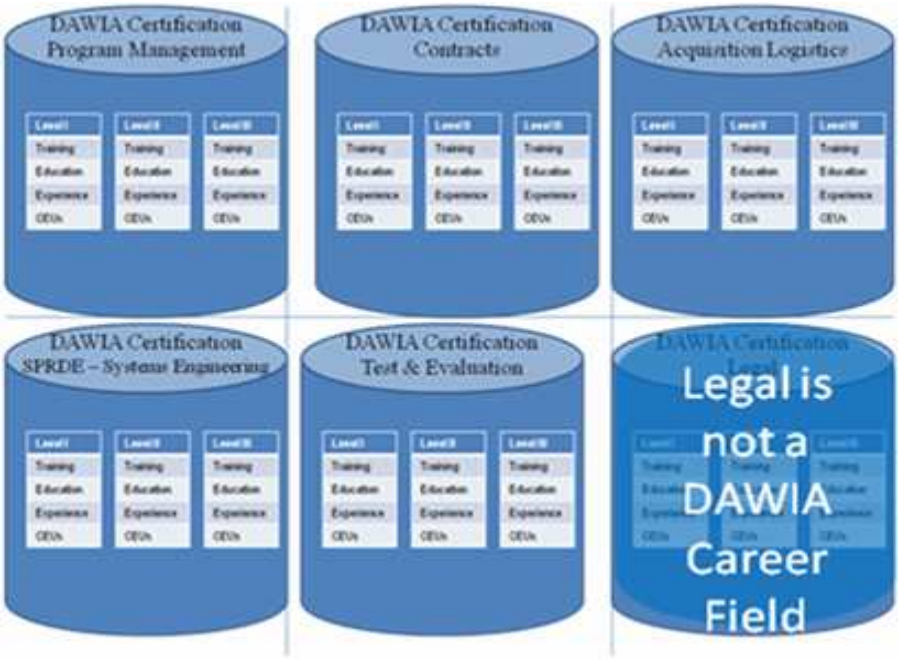

Figure 2-1. DAWIA Certification Construct

2.1.1 DAWIA Mandatory Training Courses

The DAWIA construct mandates training requirements for each acquisition career field appropriate to the three certification levels. The SPII HR Focus Team identified additional training courses from government private industry, and civilian university courses to supplement DAWIA required training in the areas of software acquisition management and engineering principles. A subset of these courses was identified for each acquisition discipline to address the specific competency needs. The result is a unique series of training courses identified for DAWIA Levels I, II, and III software acquisition generalists and experts in each of the six acquisition disciplines.

2.1.2 Continuing Training and Certification Criteria

In addition to training mandates, the DAWIA construct includes certain educational experience (e.g., degrees held, college credit, etc.), job experience (e.g., two years Program Management experience), and 80 hours of training every two years to attain and maintain certification status.

The SPII HR Focus Team recommends specific training courses, workshops, conferences, professional organizations, and other learning events relevant to software acquisition management principles be identified to include in Individual Development Plans (IDP) to meet the 80 hour biannual requirement (see sample in Appendix G).

2.2 Defense Acquisition University's Core Plus Framework

Core Plus is the "next certification framework" outlined in the AT&L Human Capital Strategic Plan Workforce Goal 4 (Provide learning assets at the point of need to support mission-responsive human capital development). Beginning on 1 October 2007, the Defense Acquisition University will change the format and requirements of all DAWIA career fields. At the center of the Core Plus concept (Figure 2-2), are foundational acquisition knowledge and skills common across acquisition disciplines. Core Functional Certification requirements identify the training, experience, and education requirements required for DAWIA certification at Levels I, II and III for each acquisition career field. In addition, information is provided to help personnel prepare a better Individual Development Plan (IDP), depending on assignment types, and activities they perform. The Core Plus training construct is well suited for the goal of role based – right fit training.

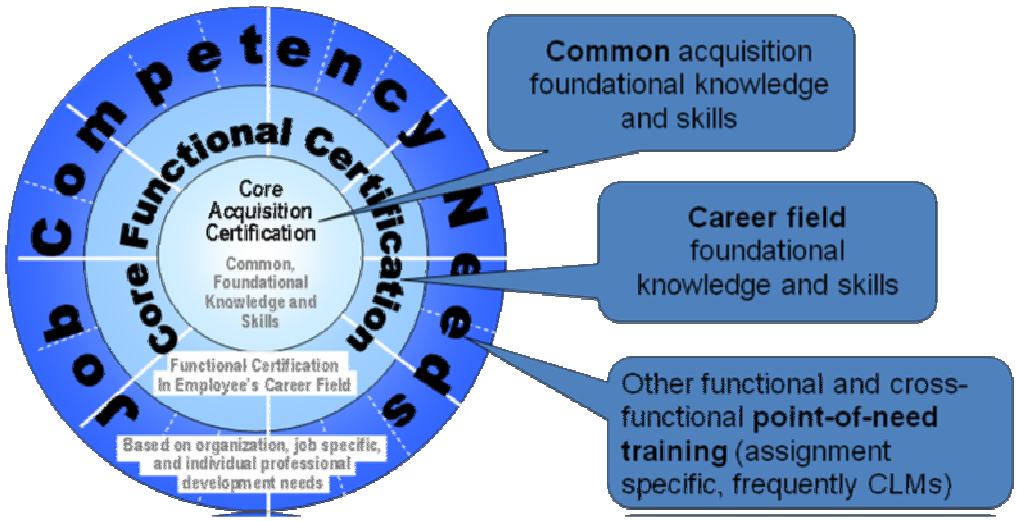

Figure 2-2. Core Plus Concept

In order for acquisition professionals to attain and sustain software acquisition management knowledge and skills, the HR Focus Team's recommendations fall into two categories:

- Supplemental Software Training (Core training courses for software generalists) – additional software related training that meets career field competency needs and should be considered as part of DAWIA's mandatory training for levels I, II, and III certification.

- Software Point of Need Training (Core Plus training courses for software generalists and experts) - software related training designed to meet different acquisition discipline job competency needs (software-intensive assignment specific) and to maintain skill currency, appropriate to DAWIA levels I, II, and III.

3.0 Methodology: Role-Based/Right-Fit Training (RB/RF)

In order to meet the goals and objectives established under the SPII HR Focus Team Charter, an analysis of the training needs of Software *Generalists, Experts, and Green Team Members* within the six different acquisition disciplines is required. The premise is that existing acquisition training is insufficient preparation for the rigors of software acquisition in today's environment. Not only do acquisition professionals need a general awareness of software acquisition and systems engineering principles; professionals in the different acquisition disciplines need tailored training to better support software acquisition for the Navy.

The SPII HR Focus Team recognized the need for acquisition professionals to have expertise in both the business side and the technical side of DoN software acquisition and management. However, the type of training and level of detail depends on the program, and the acquisition personnel's functional role. Consider a critical software-intensive acquisition program for example; Program Manager's support personnel need an in-depth understanding of software acquisition and engineering principles, particularly in light of the Navy's emphasis on Naval Open Architecture acquisition, to convey the appropriate information from their areas of responsibility. However, the Program Manager needs a more high-level, broad understanding of these principles to translate information from support personnel into program decisions. Thus, the need for role-based/right-fit training – matching training requirements to the roles of the acquisition workforce.

3.1 Functional Disciplines, Roles & Responsibilities

The HR Focus Team collaborated with the SAM Team who identified software acquisition and management functions, or "roles and responsibilities" for acquisition positions (Program Management, Systems Engineering, Logistics, Test & Evaluation, Contracts, and Legal). To ensure acquisition professionals are adequately prepared to perform those functions, the HR Focus Team recommended required experience levels as well as training requirements. The HR Focus Team's approached is described in Section 3.2 as the "Right-Fit Training Development Process" and the result is tailored training and experience recommendations to prepare the acquisition workforce for the roles and responsibilities unique to each discipline.

3.2 Right-Fit Training Development Process

A phased approach was implemented to meet the goals and objectives established under the SPII HR Focus Team Charter. Five phases make up the Right-Fit Training Development Process. See Figure 3-1.

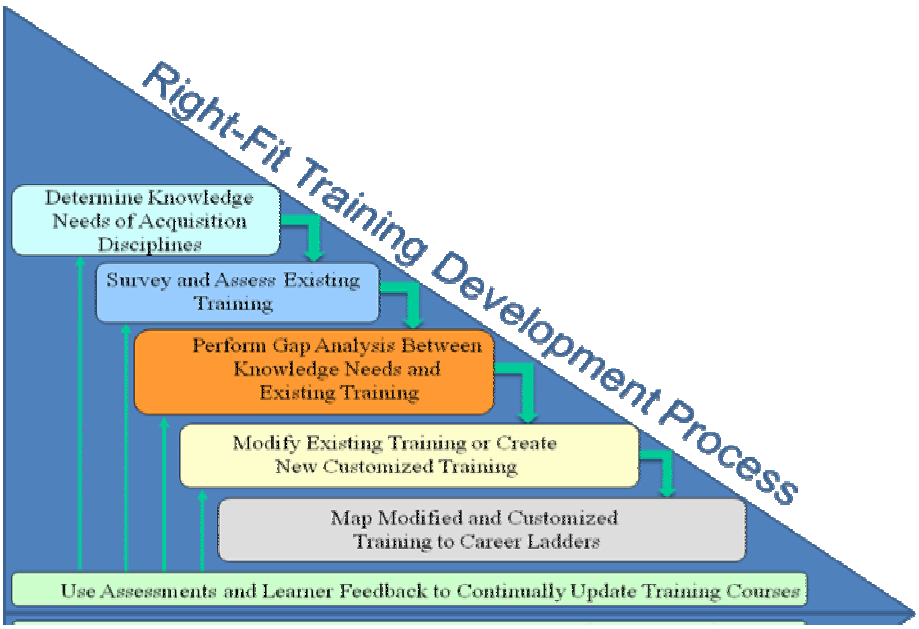

Figure 3-1. Right-Fit Training Development Process

- **Phase 1**: The first and most important phase of the Right-Fit Training Development Process requires the research and documentation of software acquisition and management competencies for each of the six acquisition disciplines. This phase is in alignment with Workforce Goal One of the Office of the Under Secretary of Defense (OUSD) Acquisition, Technology and Logistics (AT&L) Human Capital Strategic Plan (HCSP) which mandates current, standardized functional competencies. The 1994 (updated 1996) Software Management Review Team (SMRT) report served as the baseline for competency development. The first discipline reviewed by the HR Focus Team was Program Management and the competencies identified for program managers includes the SMRT competencies, and competencies derived from additional sources such as the Defense Acquisition Guide, and Clinger Cohen Act (see reference section 10.0). A meeting was held at the Air Force Institute of Technology (AFIT) on 28 August 2007 to discuss software acquisition management competencies. Participants at the meeting included representative from OSD, USAF, US Army and the Navy. At that meeting, it was agreed the competencies identified by the HR Focus Team would be the baseline and be reviewed by representatives from each service. Once the competencies were vetted by each service, they would be validated by the Functional Integrated Product Teams (FIPTs) for each acquisition discipline. Validated competencies are crucial to the success of the RB/RF training concept.

Workforce Goal One:

Align and fully integrate with overarching DoD human capital initiatives.

- **Phase 2**: In order to meet the goal of improving the skill level of software acquisition personnel, the SPII HR Focus Team developed a baseline of current software related curricula available from the academic and government-run training and/or education institutions (Naval Post-graduate School (NPS), AFIT, DAU, and Navy Systems Command) relevant for each acquisition discipline. The assessment of existing training was based on software acquisition management competencies developed in phase one. The review resulted in a list of courses to compare with the required software acquisition management competencies for each identified acquisition discipline. The list of courses reviewed can be found in Appendix A. The HR Team's course recommendations for each discipline can be found in Appendix D.

- **Phase 3**: A gap analysis was performed to determine how well the competencies identified in phase one were satisfied by the courses identified in phase two. Each course was given a rating that reflected the how well the course satisfied the competencies for the acquisition discipline certification levels I, II, and III. The ratings were derived by comparing competency requirements to course learning objectives. The adequacy ratings are defined below:

  - **N** – The course did *not* apply to competency.
  - **P** - The competency has been *partially* satisfied by the identified training course.
  - **F** – The competency has been *satisfied* by the identified training course.

  The gap analysis adequacy ratings are represented in a matrix located in Appendix E. Competencies with a low adequacy rating resulting from DAWIA required courses were supplemented with additional training courses. The gap analysis provided in this report is the HR team's best estimate, given the review was made with limited course information. The course adequacy ratings need to be validated by the respective course managers who can compare the validated competencies with the course learning objectives.

- **Phase 4**: The first set of "right-fit" training recommendations included augmenting current DAWIA requirements with relevant existing DoD training identified to help fill the gaps identified in phase three. The second step of the gap analysis indicated that even with the inclusion of the supplementary courses deficiencies still exist, though less considerable. To completely fill the training gaps, existing courses may need to be modified or as a last resort new courses created. Therefore the SPII HR Focus Team recommends the development of role-based, customized training solutions to resolve the training gaps of each acquisition discipline, and include core training, discipline-specific training, and continuing education training. Development of new courses will only be recommended after a determination that existing courses or modifications to existing courses do not satisfy the training requirements. The gap analysis performed by the HR

team could change depending on the results of the competency validation and assessment by course managers.

- **Phase 5**: Career-long learning continuums were developed for each discipline depicting the current DAU core training requirements and recommended supplemental training resulting from phases one through four. The career continuums also identify the appropriate time to take those courses in one's career (Level I, II, or III). The career-long learning continuums also show recommended education and experience requirements and follow the DAWIA Core Plus construct.

4.0 Software Acquisition Generalists – "The Masses"

4.1 Functional Disciplines

A description of the responsibilities of software acquisition generalists in each of the disciplines addressed in this study is given below. The descriptions were adapted from the AT&L Workforce Resources Position Category Descriptions (PCDs):

http://www.dau.mil/workforce/PCDs.asp

- **Program Management** – responsible for Navy acquisitions including weapon systems, command and control systems, information management systems, etc. All these systems include software as part of the acquisition process. Program managers need a broad understanding of software acquisition and systems engineering principles to translate information from support personnel (logisticians, contract specialists, systems and software engineers, legal specialists, and test & evaluation specialists) into program decisions.

- **Systems Planning, Research, Development, and Engineering (SPRDE)-Systems and Software Engineering** – plan, organize, and conduct engineering activities relating to the design, development, fabrication, installation, modification, sustainment, and/or analysis of systems or systems components across the entire life cycle. This discipline includes **SPRDE Software/IT Engineers** who plan, organize, and conduct engineering activities relating to the design, development, and/or analysis of software and information technology systems or system components.

- **Test & Evaluation Engineering** – plan, organize, manage, or conduct tests and/or evaluations associated with concepts, emerging technologies, and experiments as well as prototypes, new-, fielded-, or modified-C4ISR systems, weapons or automated information systems, equipment or materiel throughout all acquisition phases to include developmental tests, and support to in-service tests and operational tests.

- **Acquisition Logistics –** plan, develop, implement and manage effective and affordable support strategies throughout the life cycle for weapons, materiel, or information systems.

Logisticians perform a principal joint and/or component logistics supportability role during the acquisition and sustainment phases of the system and software life cycle. Logisticians also develop and implement performance-based approaches for logistics systems support. Products and services delivered by logisticians sustain system operational readiness.

- **Contracting** – develop alternatives to produce best value supplies and services, as well as manage all aspects of the life cycle of a contract or other vehicle. Apply statutory and policy procurement related requirements; support attainment of government socio-economic objectives, conduct market research; acquisition planning; cost and price analysis; solicitation and selection of sources; preparation, negotiation, and award of contracts through various methods to include negotiation; and perform all phases of contract administration, and terminate or close out of contracts.

- **Legal (Intellectual Property Attorneys) --** perform contract advisory service to the Department of Defense and other Government Agencies in negotiation, administration, settlement of contracts, and subcontracts for software-intensive products/services. Legal specialists function as consultants to various organizations under the Defense Acquisition Regulatory Council to develop innovative legal solutions to the business and other challenges facing the Navy and Marine Corps to enhance war fighting capability of the Naval Service.

4.2 Determine the Knowledge Needs for Software Acquisition within the Acquisition Disciplines

The first phase of the Right-Fit Training Development Process requires the research and documentation of software acquisition management competencies for each of the six acquisition disciplines. Accurate identification of required competencies are critical to support the curriculum review and development effort needed to ensure the best and most relevant training is provided to software acquisition management and engineering personnel.

The HR Team used the 1994 (updated 1996) Software Management Review Team (SMRT) report as a baseline for the analysis. The SMRT evaluated the software acquisition training requirements for the DoD acquisition workforce. The SMRT report identified nine top level software acquisition competencies listed below.

1. *Software Risk Management Application & Analysis* – explain typical software acquisition risks for systems, select appropriate risk management strategies and illustrate their relative merits.

2. *Software Acquisition Management Regulatory/Technical Framework Application & Analysis* – explain DoD regulatory and technical frameworks that apply for the acquisition of software-intensive systems; select and differentiate techniques appropriate to manage each class of system

3. *Government and Industry software Acquisition Management Roles* – explain and illustrate the respective roles of government and industry in software acquisition management activities

4. *Unique Software Procurement Requirements Application & Analysis* – explain software procurement requirements and use government and commercial software source selection "best practices"; illustrate proposal evaluation criteria and documentation relevant for the acquisition of software systems.

5. *Software Metrics Application & Analysis* – explain, use and illustrate tools and techniques available for planning, measuring and predicting software development progress.

6. *Analyze Software Technical Life Cycle & Relate it to System Acquisition Process* – explain the software development and integration process and the software technical life cycle and illustrate their relationships to the overall system acquisition process.

7. *Software Testing "Best Practices" Application* – explain and relate current policies and "best practices" for software test program planning and execution; and illustrate software test sufficiency

8. *Software Acquisition Management planning & Status Documentation Analysis* – explain and illustrate program office and contractor plans and status documents for development, integration, management and support of software-intensive systems.

9. *Software Economic Factors Analysis* – explain and relate the economic factors of software-intensive systems, including cost estimation, business case analysis, management of obsolescence and cost/performance technology trends.

In the SMRT report's approach, the level of understanding required for each competency was identified using the Bloom's Level Model of Cognitive Taxonomy (Table 4-1). The competencies remained the same for each acquisition discipline and levels I, II, and III within each discipline, only the degree of required understanding changed (the numbered ratings changed). The SMRT competencies for each discipline using the Bloom Taxonomy is given in Appendix B. The HR Focus Team's approach was slightly different. For the Program Management discipline, the HR Focus Team included the SMRT competencies along with additional competencies identified through various sources (DAG, Clinger Cohen, etc.). Instead of using Bloom's level ratings (1 – 6), the verbiage (e.g., defines, explains, selects, etc.) was incorporated into competency statements, based on the appropriate level of required understanding. In addition, the HR Focus Team grouped the Program Manager competencies into the nine SMRT major groupings defined above. Competencies for the other disciplines follow the SMRT format. This is why the appearance of the Program Management competencies differs from the other disciplines. At the 28 August AFIT tri-service meeting it

was decided the Software Acquisition Training and Education Working Group (SATEWG) would be established to review the competency recommendations of the HR team beginning with Program Manager.

Bloom's Table of Cognitive Taxonomy			
Numerical Level	**Level of Learning**	**Definition**	**Illustrative Verbs for Learning**
1	Knowledge	Recalls previously learned material (facts, theories) in essentially the same format as taught	Defines, describes, identify, lists, names, states
2	Comprehension	See relationships, concepts, and abstractions beyond the simple remembering of material. Typically involves translating interpreting and estimating future trends	Distinguishes, explains, gives examples, summarizes
3	Application	Use learned material in new and concrete situations, including the application o rules, methods, concepts, principles laws and theories.	Demonstrates operates, modifies, predicts, prepares, shows, solves, uses, selects
4	Analysis	Breaks down material into its components parts so the organizational structure may be understood, including the identification of the parts, analysis of the relationships between pats, and a recognition of the organizational principles involved	Diagrams, differentiates, discriminates, illustrates, outlines, subdivides, relates
5	Synthesis	Put parts together to form new patterns of structures, such as a unique communications (a theme or speech) a plan of operations (a research proposal) of a set of abstract relations (schemes for classifying information)	Composes, creates, designs, modifies, organizes, plans, revises, rewrites, writes
6	Evaluation	Judge the value of material for a given purpose. Learning in this area is the highest in the cognitive hierarchy because it involves elements of all the other categories, plus conscious value judgments based on clearly defined criteria	Appraises, criticizes, discriminates, justifies, interprets

Figure 4-1. Bloom's Table of Cognitive Taxonomy

4.3 Software Acquisition Role-Based/Right-Fit Training Analysis

An analysis for each software acquisition career field was conducted using the five phase process described in section 3.2.

4.3.1 Competency Development

The SMRT report is the baseline of competencies for five of the six acquisition disciplines. Legal (Intellectual Property Attorney) is not a DAWIA career field and the analysis for this discipline is different than the other five. The legal discipline competencies and course

recommendations are found in appendix F. Competencies were identified as levels I, II and III corresponding to DAWIA certification Levels I-III. The level of understanding required for each competency was identified using the Bloom's Level Model of Cognitive Taxonomy described in Table 4-1. An example of the Level I Program Management competencies is shown in Figure 4-2 indicating a "comprehension" (Bloom level 2) for the five competencies is required. Figure 4-3 is an example of the HR Focus Team's slightly different approach, incorporating the Bloom's verbiage into the five competency statements. The complete list of competencies for all career fields is in Appendix B. The determination of competencies needed for experts and the required level of understanding will be identified at the same time the competencies are reviewed by the SATEWG for the generalists.

Program Management Level I Competencies	Bloom's Level
Software Acquisition Management Regulatory/Technical Framework Application & Analysis	
Best system strategies for SW intensive systems	2
Affect of current system Strategies on SW Acquisition Mgmt	2
Summarize the strengths and weaknesses of current strategies	2
Impact of acquisition strategy on SW project planning and SW Engineering methods	2
Impact of Acquisition Reform	2

Figure 4-2. Example SMRT Competencies for Level I Program Mangers

Program Management Level I Competencies
Software Acquisition Management Regulatory/Technical Framework Application & Analysis
Give examples of best system strategies for SW intensive systems
Explain the effect of current system Strategies on SW Acquisition Mgmt
Summarize the strengths and weaknesses of current strategies
Explain the impact of acquisition strategy on SW project planning and SW Engineering methods
Explain the impact of Acquisition Reform

Figure 4-3. Example HR Team Defined Competencies for Level I Program Mangers

4.3.2 Training Courses Core Certification Requirements

Core Plus DAU training courses required for DAWIA certification at Levels I, II, and III (2008 catalog), in addition to the education and experience requirements were reviewed by the HR Team. The Core Plus Career Field Guide with certification standards including training, education and experience requirements, for Program Managers Level I is shown below (Figure 4-4). A list of DAWIA Core Certification Standards (pink table) for each discipline is in Appendix C.

Program Management *(Entry)* Level I

Type of Assignment	Representative Activities
Weapon Systems	Participates in an IPT delivering a weapon, C2/network-centric, or space system; performs financial and status reporting and basic logistic activities; supports preaward contract activities and workload planning and scheduling
Services	Assists in acquisition planning, assessing risk (technical, cost, and schedule), and contract tracking and performance evaluation
Business Mgt Systems/IT	Participates in a business process IPT, fundamentals of enterprise integration (EI), and outcome-based performance measures
International	N/A at Level I

Core Certification Standards[1] *("R" indicates Resident instruction.)*	
Acquisition Training	• **ACQ 101** *Fundamentals of Systems Acquisition Management*
Functional Training	• **SYS 101** *Fundamentals of Systems Planning, Research Development and Engineering* (Required for certification on 4/1/08) • **CLB 007** *Cost Analysis* (Required for certification on 4/1/08) • **CLB 016** *Introduction To Earned Value Management* (Required for certification on 4/1/08)
Education	Formal education not required for certification
Experience	• 1 year acquisition experience for Level I certification

Core Plus Development Guide[2]	Type of Assignment			
Training *("R" indicates Resident instruction.)*	Weapon Systems	Services	Business Mgmt/IT	International
BCF 103 *Fundamentals of Business Financial Management*	X	X	X	
IRM 101 *Basic Information Systems Acquisition*	X	X	X	
LOG 101 *Acquisition Logistics Fundamentals*	X	X		
PQM 101 *Production, Quality and Manufacturing Fundamentals*	X	X		
SAM 101 *Basic Software Acquisition Management*	X		X	
TST 102 *Fundamentals of Test and Evaluation*	X			
CLC 011 *Contracting for the Rest of Us*	X	X	X	
CLE 025 *Information Assurance for Acquisition Professionals*	X	X	X	
CLL 008 *Designing for Supportability in DoD Systems*	X	X		
CLL 011 *Performance Based Logistics*	X	X		
CLM 017 *Risk Management*	X	X	X	
CLM 022 *Introduction to Interoperability*	X	X	X	
CLM 029 *Net-Ready Key Performance Parameter (NR-KPP)*	X		X	
Education				
Baccalaureate degree, preferably with a major in engineering, systems management, or business administration.				
Experience				
1 additional year acquisition experience				

[1] These standards list the training, education, and experience required for certification at this level.
[2] When preparing your IDP, you and your supervisor should consider the training, education, and experience listed in this Core Plus Development Guide if not already completed.

Figure 4-4. Core Plus Career Field Guide for Program Managers Level I

4.3.3 Additional Courses

The HR Team identified courses from NPS, AFIT, private industry and SYSCOMs to potentially augment DAU courses in order to enhance software acquisition training. A complete list of recommended courses can be found in Appendix D.

4.3.4 Gap Analysis

Using the competencies (Appendix B) and course learning objectives from the courses listed in Appendix A, a gap analysis was conducted to determine how well the courses satisfied the competencies. The adequacy ratings are defined below:

- **N** – The course did *not* apply to competency.
- **P** - The competency has been *partially* satisfied by the identified training course.
- **F** – The competency has been *satisfied* by the identified training course.

An example for Program Management is shown in fig 4.5 and the complete gap analyses for all disciplines are included in Appendix E (to be inserted). In some cases the HR Team made the Gap Analysis with limited course information. Therefore the gap analysis outcomes and subsequent recommendations are subject to change depending on the findings of the SATEWG..

	ACQ 101: Fundamentals of Systems Acquisition Mgmt	**SYS 101:** Fundamentals of SPRDE	**CLB 007:** Cost Analysis	**CLB 016:** Introduction to EVM	**SAM 101**: Basic SW Acquisition Mgmt	AFIT/ **SYS 130**: CMMI
	Level I					
	DAWIA				**Additional**	
Software Acquisition Management Regulatory/Technical Framework Application & Analysis						
Give examples of best system strategies for SW intensive systems	N	N	N	N	F	N
Explain the effect of current system Strategies on SW Acquisition Mgmt	N	N	N	N	F	N
Summarize the strengths and weaknesses of current strategies	N	N	N	N	F	N
Explain the impact of acquisition strategy on SW project planning and SW Engineering methods	N	N	N	N	F	N
Explain the impact of Acquisition Reform	F	N	N	N	F	N

Figure 4-5. Example Training Gap Analysis for Program Management Discipline

4.3.5 Proposed Career-Long Learning Continuums

Based on the analysis and validation efforts, career-long learning continuums were proposed for each of the acquisition disciplines. The career-long learning continuums follow the DAWIA certification framework, incorporating the Core Plus construct. The career-long learning continuum first lists the required training for DAWIA certification at Levels I, II, and III. Additional point-of-need courses identified by the HR Team are listed as "Core Plus For Software Acquisitions" for Levels I, II, and III to minimize the training gaps. Software acquisition minimum work experience requirements are also described. Finally, software specific continuing education requirements are described as part of DAWIA's 80 hour biannual requirement, and sample list of software relevant learning activities is provided in Appendix G.

4.3.5.1 Program Management

Program Management – responsible for Navy acquisitions including weapon systems, command and control systems, information management systems, etc. All these systems include software as part of the acquisition process. Program managers need a broad understanding of software acquisition, systems engineering principles, and the fundamentals of open system architecture to translate information from support personnel (logisticians, contract specialists, systems and software engineers, legal specialists, and test & evaluation specialists) into program decisions.

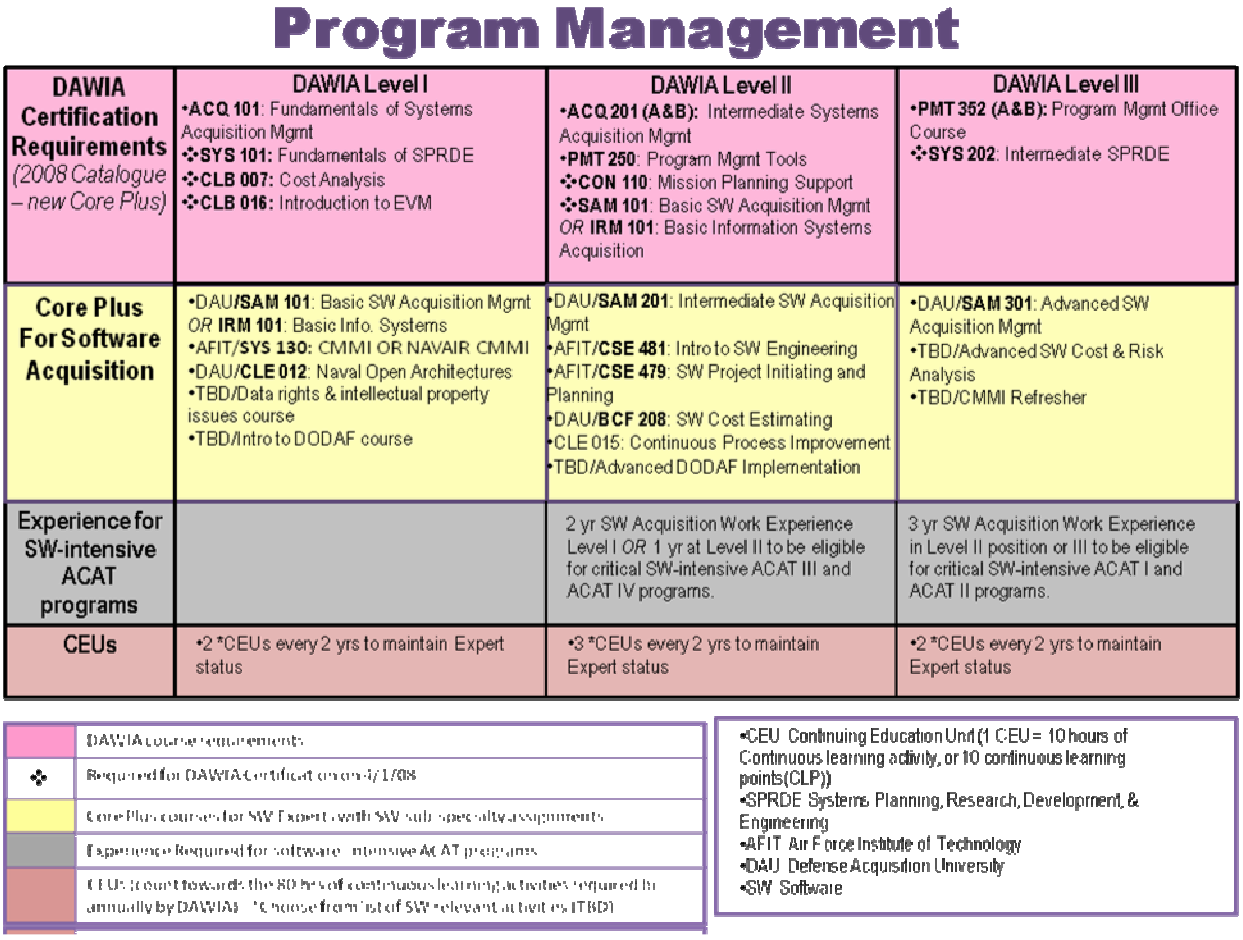

Figure 4-6. Program Management Career-Long Learning Continuum

4.3.5.2 SPRDE Systems & Software Engineering

Systems Planning, Research, Development, and Engineering (SPRDE)-Systems and Software Engineering (SE) – plan, organize, and conduct engineering activities relating to the design, development, fabrication, installation, modification, sustainment, and/or analysis of systems or systems components across the entire life cycle. This discipline includes **SPRDE Software/IT Engineers** who plan, organize, and conduct engineering activities relating to the design, development, and/or analysis of software and information technology systems or system components.

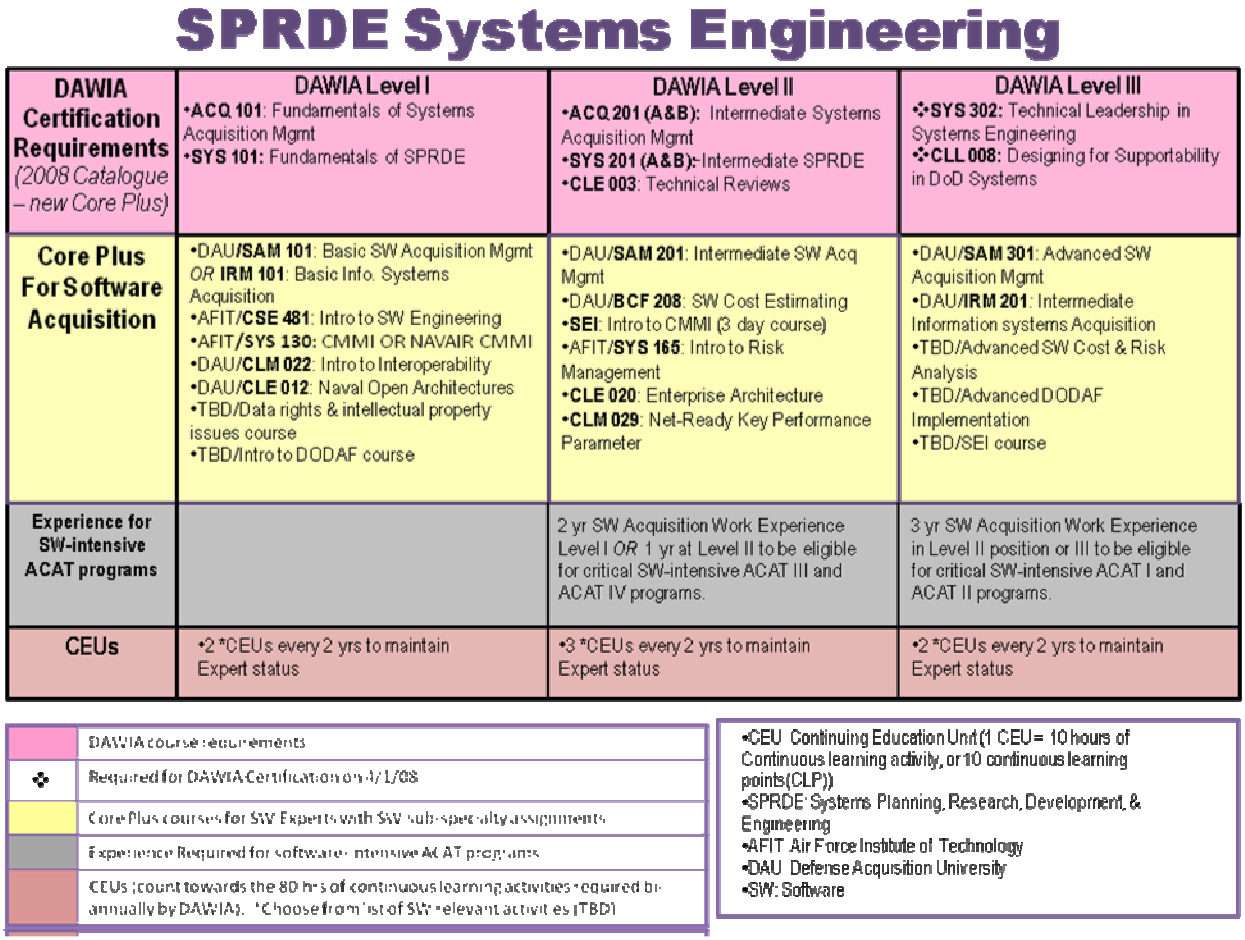

Figure 4-7. SPRDE-SE Career-Long Learning Continuum

4.3.5.3 T&E Engineering

Test & Evaluation (T&E) Engineering – plan, organize, manage, or conduct tests and/or evaluations associated with concepts, emerging technologies, and experiments as well as prototypes, new-, fielded-, or modified-C4ISR systems, weapons or automated information systems, equipment or materiel throughout all acquisition phases to include developmental tests, and support to in-service tests and operational tests.

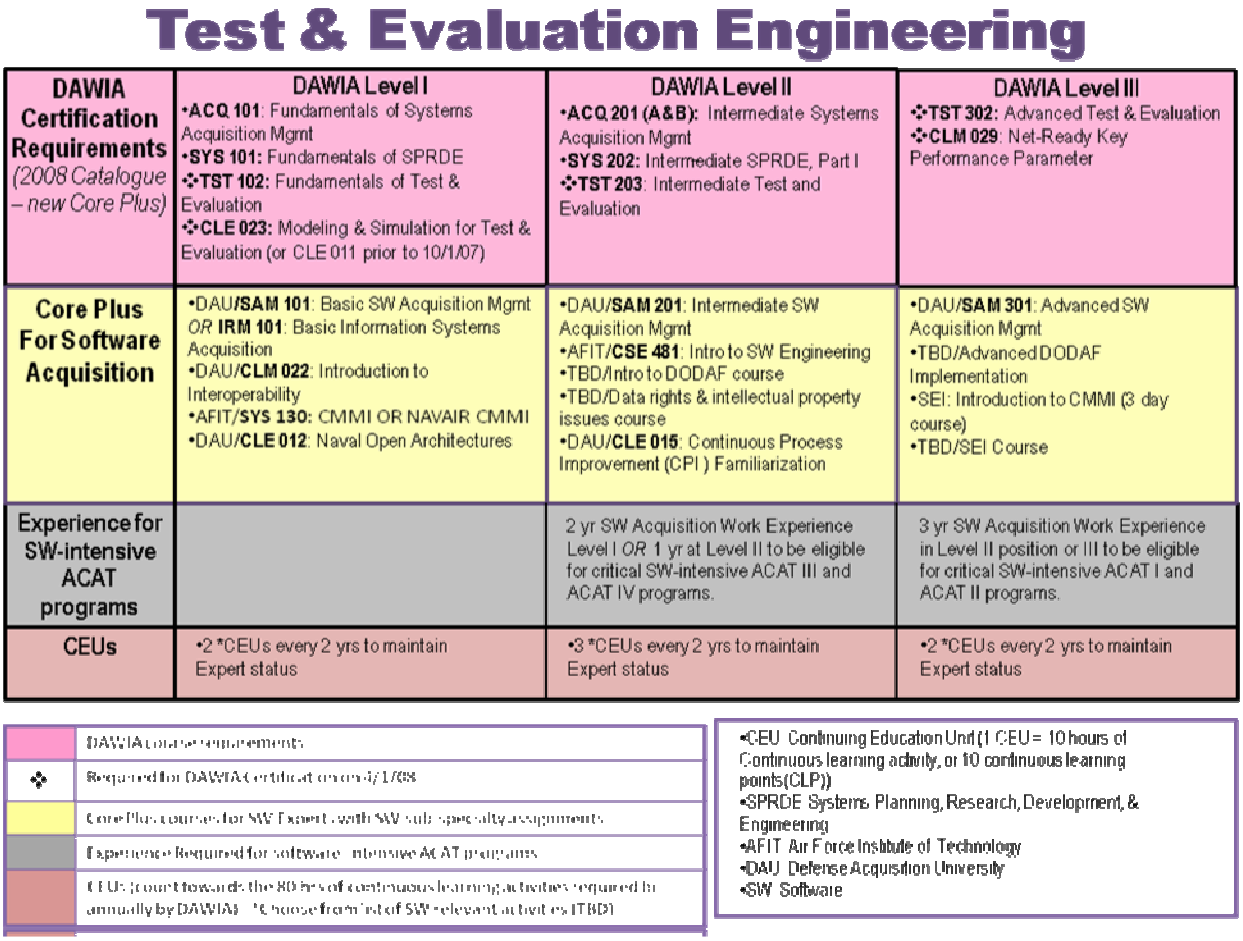

Figure 4-8. T&E Engineering Career-Long Learning Continuum

4.3.5.4 Acquisition Logistics

Acquisition Logistics – plan, develop, implement and manage effective and affordable support strategies throughout the life cycle for weapons, materiel, or information systems. Logisticians perform a principal joint and/or component logistics supportability role during the acquisition and sustainment phases of the system and software life cycle. Logisticians also develop and implement performance-based approaches for logistics systems support. Products and services delivered by logisticians sustain system operational readiness.

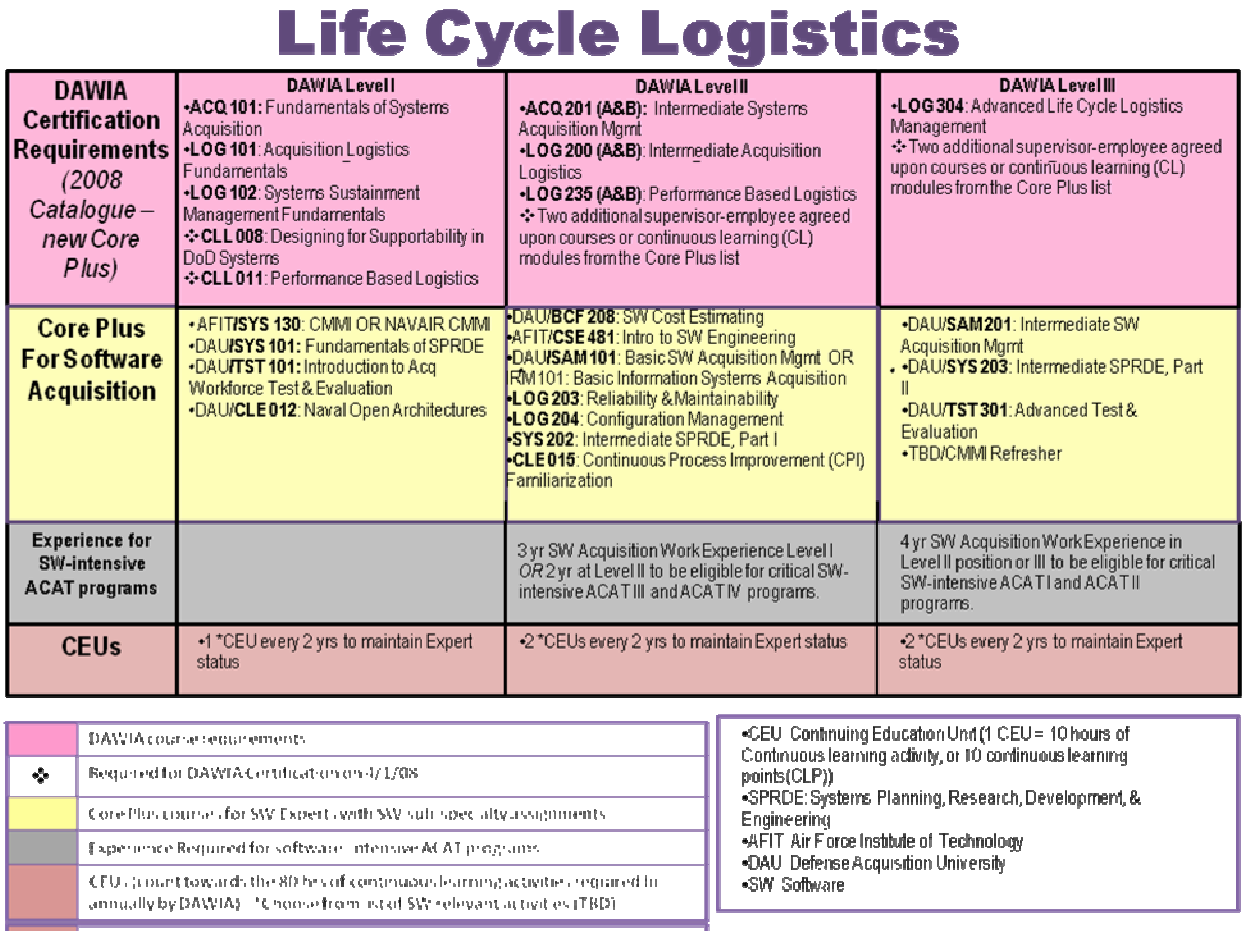

Figure 4-9. Acquisition Logistics Career-Long Learning Continuum

4.3.5.5 Contracting

Contracting – develop alternatives to produce best value supplies and services, as well as manage all aspects of the life cycle of a contract or other vehicle. Apply statutory and policy procurement related requirements; support attainment of government socio-economic objectives, conduct market research; acquisition planning; cost and price analysis; solicitation and selection of sources; preparation, negotiation, and award of contracts through various methods to include negotiation; and perform all phases of contract administration, and terminate or close out of contracts.

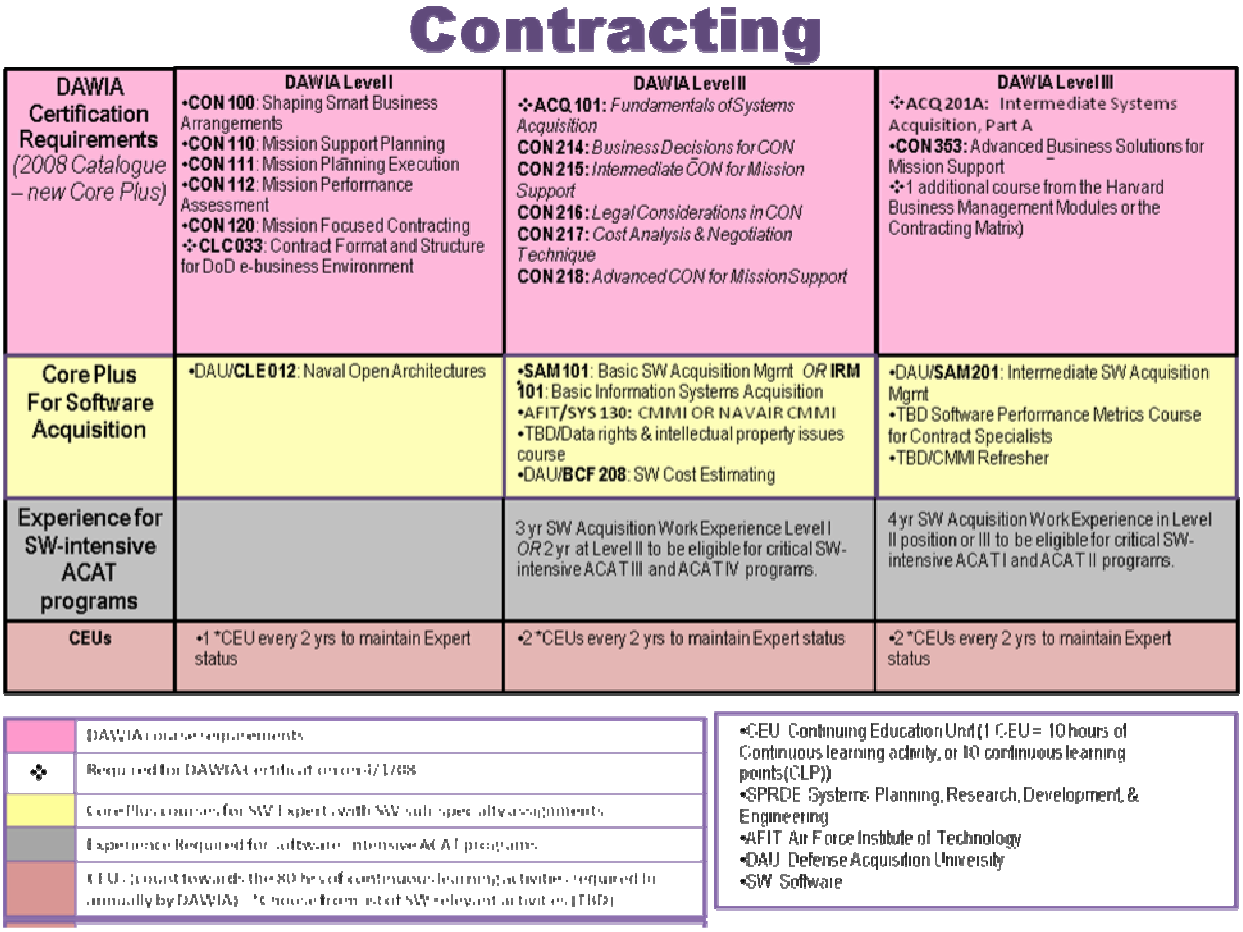

Figure 4-10. Contracting Career-Long Learning Continuum

4.3.6 Core Plus Career Field Guide Integration

Figures 4-11, 4-12, and 4-13, are an example for the Program Management discipline (Levels I, II, and III) that demonstrate the integration of the HR recommendations into the Core Plus Career Field Guides:

http://www.dau.mil/workforce/index_sub1_CorePlus.asp?eventid=1583

This example contains the same information provided in the career-long learning continuum for Program Managers (Figure 4-5), but presents it in the familiar format of the Core Plus Career Field Guides as an example of how to integrate the HR Team's recommendations if they are accepted by the FIPTs and DAU. The example below is provided for the Program Management Discipline, and would be repeated for the remaining disciplines once the competency and gap analysis validation efforts have been completed.

Courses in red text are recommended by the SPII HR Focus Team for software generalists to minimize the training deficiencies identified in the gap analysis. For example, the HR Focus Team recommends AFIT course CSE 481 Introduction to Software Engineering for Level I Program Managers (Figure 4-11). A red "X" indicates the course is recommended by the SPII HR Team as point-of-need training for software generalists, and should be strongly considered for IDPs. For example, the HR Focus Team is in agreement with DAU that SAM 101 is relevant for Level I Program Managers' IDPs (Figure 4-11). In addition, the HR Focus Team recommends a minimum level of experience to be eligible for software-intensive ACAT programs for Level II and Level III Program Managers. For example, a minimum of two years of software acquisition experience is recommended for Level II Program managers to be eligible for software-intensive ACAT III and ACAT IV programs (Figure 4-12). Finally, minimum CEU requirements for each level are defined, and the HR Focus Team recommends software relevant learning activities (sample in Appendix G) be identified to meet CEU requirements as part of DAWIA's 80 hour biannual requirement.

The information in the career-long learning continuums as well as in Figures 4-11, 4-12, and 4-13 assumes Program Management competencies and gap analysis were validated and approved by the FIPT's, and course mangers. Therefore the HR Teams recommendations could change based on the outcomes of the validation process. In this example for Program Managers, only "point-of-need" or "core plus" training was recommended. Additional analysis with SMEs (FIPTs, course managers, etc.), could result in recommendations for "supplemental training" or "core certification" training required for DAWIA certification of Program Managers. One example of a course to be incorporated is the Defense Acquisition University CLE 012, Naval Open Architecture. CLE 012 provides program managers with the knowledge about the programmatic and engineering aspects of open architecture acquisition that will help them comply with existing Navy Policy[1].[23] It should also be noted that learning modules from the

[1] DoD Directive 5000.1. "The Defense Acquisition System" 12 May 2003.

[2] Wynne, Michael, "Amplifying DoDD 5000.1 Guidance Regarding Modular Open Systems Approach (MOSA) Implementation". 05 April 2004.

recommended supplemental courses could be added to existing DAU courses to fulfill the competency gaps thus removing the need for a complete additional course. These types of determinations would be made as the competencies and courses are reviewed by subject matter experts and the SATEWG.

[3] Deputy Chief of Naval Operations. "Requirements for Open Architecture (OA) Implementation". 23 Dec 2005.

Program Management Level I

Type of Assignment	Representative Activities
Weapon Systems	Participates in an IPT delivering a weapon, C2/network-centric, or space system; performs financial and status reporting and basic logistic activities; supports preaward contract activities and workload planning and scheduling
Services	Assists in acquisition planning, assess risk (technical, cost, and schedule), and contract tracking and performance evaluation
Business Mgmt, IT	Participates in a business process IPT, fundamentals of enterprise integration (EI), and outcome-based performance measures
International	N/A at Level I

Core Certification Standards [1]	
Acquisition Training [2]	• **ACQ 101**: *Fundamentals of Systems Acquisition Management*
Functional Training [2]	• **SYS 101:** *Fundamentals of Systems Planning, Research Development and Engineering* (Required for certification on 4/1/08) • **CLB 007:** *Cost Analysis* (Required for certification on 4/1/08) • **CLB 016:** *Introduction To Earned Value Management* (Required for certification on 4/1/08)
Education	Formal education not required for certification.
Experience	1 year of acquisition experience for Level I certification

Core Plus Development Guide [2]	**Type of Assignment**			
Training [3]	**Weapon Systems**	**Services**	**Business Mgmt, IT**	**International**
BCF 103: *Fundamentals of Business Financial Management*	X	X	X	
[4] **IRM 101:** *Basic Information System Acquisition*	XX	X	X	
LOG 101: *Acquisition Logistics Fundamentals*	X	X		
PQM 101: *Production Quality and Manufacturing Fundamentals*	X	X		
[4] **SAM 101:** *Basic Software Acquisition Management*	XX	X	XX	
TST 102: *Fundamentals of Test and Evaluation*	X			
CLC 011: *Contracting for the Rest of Us*		X	X	
CLE 025: *Information Assurance for Acquisition Professionals*	X	X	X	
CLL 008: *Designing for Supportability in DoD Systems*	X	X		
CLL 011: *Performance Based Logistics*	X	X		
CLM 017 *Risk Management*	X	X	X	
CLM 022: *Introduction to Interoperability*	X	X	X	
CLM 029: *Net Ready Key Performance Parameter (NR-KPP)*	X		X	
***AFIT/CSE 481**: Introduction to Software Engineering*	X	X		
***AFIT/SYS 130**: CMMI OR NAVAIR CMMI*	X	X	X	
***CLE 012**: Naval Open Architecture*	X	X	X	
Continuing Education Requirements[5]				
***TBD** (2 CEUs every two years to include recommended courses)*	X	X		
Education				
Baccalaureate degree, preferably with a major in engineering, systems management, or business administration.				
Experience				
1 additional year acquisition experience				

[1] These Standards list the training, education and experience required for DAWIA certification at this level.
[2] When preparing your IDP, you and your supervisor should consider the training, education and experience listed in this Core Plus Developmental Guide if not already completed.
[3] *Courses in red text are recommended by the SPII HR Team for software generalists to supplement DAU's Core Plus Framework. A red "X" indicates this course is recommended by the SPII HR Team for software generalists, and should strongly be considered for IDPs.*
[4] *IRM 101 and SAM 101 are equivalent per SPII HR Team recommendations (letter signed by Navy DACM FY07).*
[5] *Continuing education courses identified as relevant to software acquisition competencies needed by software generalists. These courses count towards the 80 hours of continuous learning activities required bi-annually by DAWIA.*

Figure 4-11. Core Plus Career Field Guide with HR Focus Team Training and Experience Recommendations for Program Management Level I

Program Management Level II

Type of Assignment	Representative Activities
Weapon Systems	Structures and guides systems engineering activities; establishes a risk/opportunity program; structures and conducts technical reviews; works with contracting personnel; maintains configuration control; and leads IPTs in support of developing and delivering a weapon, C2/network-centric, or space system
Services	Structures incentives tied to desired outcomes for service contracts, prepares plans for mitigating risks, provides contract tracking and oversight, and performs most acquisition planning tasks as established in Attachment 1 to AT&L Services Memo of October 2, 2006
Business Mgmt, IT	Leads IPTs, identifies and manages enterprise-level business systems and issues, and applies performance measures within the acquisition community and program office context that directly impact systems under development
International	Participates in successful cooperative development or production partnership during presystem acquisition or system acquisition with allied and friendly foreign nations; other types of assignments also apply

Core Certification Standards [1]	
Acquisition Training[2]	• **ACQ 201 A**: Intermediate Systems Acquisition Management, Part A • **ACQ 201 B**: Intermediate Systems Acquisition Management, Part B **CR**
Functional Training[2]	• **PMT 250**: Program Management Tools • **CON 110:** *Mission Planning Support* (Required for certification on 4/1/08) • [4]**SAM 101:** *Basic Software Acquisition Management* (Required for certification on 4/1/08) *OR* ***IRM 101:*** *Basic Information System Acquisition*
Education	Formal education not required for certification.
Experience	2 years acquisition experience required for Level II Certification; at least 1 year of this experience must be in program management

Core Plus Development Guide [2]	Type of Assignment			
Training [3]	**Weapon Systems**	**Services**	**Business Mgmt, IT**	**International**
ACQ 265: *Mission Focused Services Acquisition* **CR**		X		
BCF 102: *Fundamentals of Earned Value Management System*	X	X	X	
BCF 215: *Operating & Support Cost Analysis* **CR**	X	X	X	
LOG 102: *Systems Sustainment Management Fundamentals*	X	X		
PMT 202: *Multinational Program Mgt Course* **CR**				X
PMT 203: *International Security & Technology Transfer/Control* **CR**				X
PQM 101: *Production Quality and Manufacturing Fundamentals*	X	X		
SAM 201: *Intermediate Software Acquisition Management* **CR**	XX	X	X	
CLE 004: *Introduction to Lean Enterprise Concepts*	X	X	X	
CLE 006: *Enterprise Integration Overview*			X	
CLE 022: *Program Manager Introduction to Anti-tamper*	X			
CLI 001: *International Armaments Cooperation (IAC) Part 1*				X
CLI 002: *International Armaments Cooperation (IAC) Part 2*				X
CLI 003: *International Armaments Cooperation (IAC) Part 3*				X
CLI 004: *Information Exchange Program DoD Generic for RDT&E*				X
CLL 002: *DLA Support to Program Manager*	X	X		
CLL 006: *Depot Maintenance Partnering*	X	X		
CLM 025: *COTS for PMs*	X	X	X	
CLM 031: *Improved Statement of Work*	X	X		
CLM 036: *Fundamentals of Technology Transfer and Export Control*				X
BCF 208: Software Cost Estimating	X	X		
CLE 015: Continuous Process Improvement	X	X	X	X
AFIT/CSE 481: Introduction to Software Engineering	X			
AFIT/CSE 479: Software Project Initiating and Planning	X	X		
Continuing Education Requirements[5]				
TBD (3 CEUs every two years to include recommended courses)	X	X		
Education				
Master's degree, preferably with a major in engineering, systems management, business administration, or a related field.				
Experience[6]				
• An additional 2 years of acquisition experience; preferably in a systems program office or similar organization • *2 years of software acquisition work experience to be eligible for software-intensive ACAT III and ACAT IV programs.*				

[1] These Standards list the training, education and experience required for DAWIA certification at this level.
[2] When preparing your IDP, you and your supervisor should consider the training, education and experience listed in this Core Plus Developmental Guide if not already completed.
[3] Courses in red text are recommended by the SPII HR Team for software generalists to supplement DAU's Core Plus Framework. A red "X" indicates this course is recommended by the SPII HR Team for software generalists, and should strongly be considered for IDPs.
[4] IRM 101 and SAM 101 are equivalent per SPII HR Team recommendations (letter signed by Navy DACM FY07).
[5] Continuing education courses identified as relevant to software acquisition competencies needed by software generalists. These courses count towards the 80 hours of continuous learning activities required bi-annually by DAWIA.
[6] The SPII HR Team recommends a minimum level of experience to be eligible for software-intensive ACAT programs.

Figure 4-12. Core Plus Career Field Guide with HR Focus Team Training and Experience Recommendations for Program Management Level II

Program Management Level III

Type of Assignment	Representative Activities
Weapon Systems	Leads and provides oversight of IPTs delivering a weapon, C2/network-centric, or space system; leads tasks supporting preaward contracts, financial management, risk management, systems engineering, total ownership cost determination, contract coordination, and communications
Services	Organizes and leads DoD professional, administrative, and management support service contracting as relates to developing clearly stated and actionable requirements packages; coordinates with local procurement contracting officers, and ensures opportunities for socio-economic business concerns. Performs all acquisition strategy requirements actions noted in Attachment 1 to AT&L Services Memo of October 2, 2006
Business Mgmt, IT	Oversees transformation integration, planning and performance, and investment management as applies to the acquisition community, program office(s), and system(s) under development
International	Plans and supervises groundwork for future cooperation during presystem acquisition or participates in successful cooperative development or production partnership during presystem acquisition or system acquisition with allied and friendly foreign nations. Other types of assignments also apply

Core Certification Standards [1]	
Acquisition Training [2]	None Specified
Functional Training [2]	• **PMT 352 A**: Program Management Office Course, Part A • **PMT 352 B**: Program Management Office Course, Part B ***CR*** • **SYS 202:** Intermediate System Planning, Research, Development, & Engineering (Required for certification on 4/1/08)
Education	Formal education not required for certification.
Experience	4 years of acquisition experience: • At least 2 years of this experience must be in a program office or similar organization (dedicated matrix support to a PM or PEO, DCMA Program Integrator, or Supervisor of Shipbuilding) • At least 1 year of this experience must be in a program management position with cost, schedule, and performance responsibilities

Unique Position Training Standards [2]	
PEOs; PM/DPM of MDAP/MAIS; PM/DPM of Significant Non Major Programs	**PMT 401:** *Program Mgr's Course* **CR** and **PMT 402**: *Executive Program Mgr's Course* **CR; OR PMT 302:** *Advanced PM Course* and **PMT 402**: *Executive Program Mgr's Course* **CR**

Core Plus Development Guide [3]	**Type of Assignment**			
Training [4]	**Weapon Systems**	**Services**	**Business Mgmt, IT**	**International**
ACQ 452: *Forging Stakeholder Relationships* **CR**	X	X	X	
BCF 207: *Economic Analysis* **CR**	X	X	X	
BCF 209: *Acquisition Reporting for Major Defense Acquisition Prog's* **CR**	X		X	
IRM 201: *Intermediate Information Systems Acquisition* **CR**	X	X	X	
LOG 200: *Intermediate Acquisition Logistics, Part A*	X	X		
LOG 201: *Intermediate Acquisition Logistics, Part B* ***CR***	X	X		
LOG 204: *Configuration Management*	X		X	
LOG 235: *Performance Based Logistics, Part A*	X	X		
LOG 236: *Performance Based Logistics Part B* **CR**	X	X		
PMT 304: *Advanced International Management Workshop* **CR**				X
PMT 403: *Program Manager's Skills* (ACAT III only) **CR**	X	X	X	
PQM 201A: *Intermediate Production, Quality & Manufacturing, Part A*	X			
SAM 301: *Advanced Software Management* **CR**	XX	XX	X	
SYS 203: *Intermediate SPRDE Part B* **CR**	X			
TST 203: *Intermediate Test & Evaluation* **CR**	X			
CLE 008: *Six Sigma; Concepts and Processes*	X	X	X	
CLL 201: *Diminishing Mfg Sources & Materials Shortages Fundamentals*	X	X	X	
Continuing Education Requirements [5]				
TBD (2 CEUs every two years to maintain software subspecialty)	X	X		
Education				
Master's degree, preferably with a major in engineering, systems management, business administration, or a related field.				
Experience [6]				
• An additional 2 years of acquisition experience; preferably in a systems program office or similar organization • *3 years of software acquisition work experience to be eligible for software-intensive ACAT I and ACAT II programs.*				

[1] These Standards list the training, education and experience required for DAWIA certification at this level.
[2] Workforce members assigned to the position(s) identified must meet the training standard(s) identified within six (6) months of assignment.
[3] When preparing your IDP, you and your supervisor should consider the training, education and experience listed in this Core Plus Developmental Guide if not already completed.
[4] Courses in red text are recommended by the SPII HR Team for software generalists to supplement DAU's Core Plus Framework. A red "X" indicates this course is recommended by the SPII HR Team for software generalists, and should strongly be considered for IDPs.
[5] Continuing education courses identified as relevant to software acquisition competencies needed by software generalists. These courses count towards the 80 hours of continuous learning activities required bi-annually by DAWIA.
[6] The SPII HR Team recommends a minimum level of experience to be eligible for software-intensive ACAT programs.

Figure 4-13. Core Plus Career Field Guide with HR Focus Team Training and Experience Recommendations for Program Management Level II

5.0 Software Acquisition Experts and Green Team Members

The HR team recognized the need for a small group of Software acquisition experts within each acquisition discipline. The same methodology described in section 3.0 used to identify RB/RF training solutions for Generalists, will be applied to Experts and Green Team members. The training for the experts and Green Team members will include courses from private industry, graduate schools and seminars and could lead to graduate degrees and/or private industry certifications such as SEI SCAMPI appraisers. The training opportunities are summarized in Table 5.1.

Group Category	Generalists	Experts	Green Team Members
Where do the HR Team's training recommendations fit into the Core Plus Framework?	Core - DAWIA Required Courses for Certification *and* Core Plus – Courses recommended for IDPs.	Core Plus - Courses recommended for IDPs.	Core Plus - Courses recommended for IDPs.
Who owns the courses being recommended as part of the HR solution?	Mostly DAU owned courses, and some other DOD training	Mostly DAU courses, but more emphasis on other DOD, Private Industry, and Civilian institutions	More emphasis on Private Industry, and Civilian institutions
How are personnel certified?	DAWIA Certification at Levels I, II, III	DAWIA and Private Industry/Civilian Certifications	DAWIA and Private Industry/Civilian Certifications

Table 5-1. Comparison of Recommendations for Generalists and Experts

Potential training sources and programs for experts and Green Team members are shown below:

- Government Institutions
    - Naval Postgraduate School (NPS) - Graduate School of Engineering and Applied Sciences (GSEAS) offers a Masters (MS) degree in Systems Engineering to military officers and DoD civilians. Graduate School of Business & Public Policy (BPP). Offers Master of Business Administrations (MBA) programs and a MS in

Program Management (MSPM), Contract Management (MSCM), Systems Engineering Management (MSSEM), and in Management (MSM). Also offers the professional development program Advanced Acquisition Program (AAP).

- Air Force Institute of Technology (AFIT) - School of Systems and Logistics Software Professional Development Program (SPDP) offers a distance learning, professional continuing education program for military and DoD civilians. One residential capstone course. AFIT funds SPDP courses. SPDP is a registered educational provider for IEEE's Certified Software Development Professionals.

- Private Industry Institutions (list is not all inclusive)
  - Carnegie Mellon Software Engineering Institute (SEI) offers Certificate Programs and courses in Software Engineering Process Management, Personal Software Process, Software Process Lines, Software Architecture, and Information Security.
  - IEEE Computer Society - offers a certificate program Certified Software Development Professional (CSDP). Intended for mid-level software engineering professionals and features exam-based testing demonstrating mastery of a Body of Knowledge (BOK). Domains covered by the exam include Business Practices and Engineering Economics, Software Requirements, Software Testing, and Software Quality.

- Civilian Universities (list is not all inclusive)
  - Winthrop University – MS in Software Engineering trains professionals in the specialized area of development and maintenance of computer software, and the management of the professional processes involved in software development.
  - George Mason University – School of Information Technology and Engineering offers a MS degree in Software Engineering (MS-SWE) and provides specialized knowledge and experience in developing and modifying large, complex systems. It emphasizes the technical and business aspects of the software engineering process.
  - University of Central Florida (UCF) – Master's program in Computer Engineering offers four tracks: computer Networking, Digital Systems, Intelligent Systems, and Software Engineering. UCF also offers a MS and Ph.D in Modeling and Simulation.

6.0- Navy Five Vector Model

The SPII HR Focus Team considered the Navy's Five-Vector Model (5VM) concept for comparing an individual's experiences, schools, courses, accomplishments and other career milestones with the skills needed for a particular job. The HR team felt this ability to map skills to job requirements and then produce an individual development plan to address any training deficiencies was a valuable tool in ensuring acquisition personnel were adequately trained. Unfortunately, the Navy has stopped development on the 5VM. However the 5VM concept would be very useful in attaining the goals envisioned by role-based right-fit training. A recommendation of the HR focus team is for the Navy to resurrect 5VM capability.

7.0 Career-Long Learning Continuum

Technology, processes, and methodologies are in constant flux. The Navy's acquisition professionals will be constantly challenged with ever-changing, complex performance requirements. With the increasing implementation of software solutions for Navy systems and subsystems, it is important for Navy acquisition professionals to obtain, sustain, and continually improve their proficiencies not only in their respective disciplines, but in software acquisition best practices. As part of the SPII HR Focus Team's solution set, the proposed Career-Long Learning Continuum provides software acquisition professionals opportunities to hone and to maintain their skills.

The Career-Long Learning Continuum offers more than a traditional "bricks-and-mortar" set of training courses. It is a new philosophy of continuous improvement and the opportunity for training with the newer robust, engaging, motivating, and self-paced training technologies. These new training technologies shift the responsibility and the desire for self-improvement to the acquisition professional. This approach will offer professionals a continuum of milestones and experiences that are carefully structured and tailored for each software acquisition discipline.

Career-Long Learning Continuums also allow for position-to-resume gap analyses. The goal of the gap analysis is to identify the activities needed to advance one's career, and to incorporate these events into Individual Development Plans. In addition to DoD mandated training courses for acquisition personnel, additional training, experience, and continuous learning events are planned in order to qualify personnel for DoN software-critical acquisition professional positions.

7.1 Continuing Education Units (CEU)

In order to sustain proficiency in required software competencies and maintain DAWIA certification, the DAWIA acquisition workforce must attain 80 hours of CEU credits every two years. There is wide latitude on what constitutes CEU credit and how they are attained. The HR team proposes that some of the CEUs must come from a list of courses which focus on software acquisition. The number of CEUs depends on the level of expertise needed for a specific acquisition position. The CEU course offerings will be regularly updated and reviewed to stay

abreast of the latest in software business practices, policies, processes and methodologies. In the HR Focus Team's recommendations, only the CEU requirement was listed and not specific courses. Courses will be identified after competency validation.

8.0 Media and Delivery Mode Analysis

As a result of collaboration with NPS, DAU, and Navy SYSCOMs, the proposed training plan includes recommendations to leverage or modify certain existing training curricula to satisfy the gaps identified in Section 3.2. A training media and delivery mode analysis was conducted by the HR Focus Team and identified the following requirements:

- There is a need to provide access and adequate training for significant numbers of acquisition professionals.
- There is a need to keep the direct cost of training (training fees, travel, materials, etc.) and indirect cost of training (time away from job) at a minimum.

In addition to traditional classroom instruction, the analysis identified alternatives that may be used to provide required training. The HR Focus Team's solution approach considers the requirements identified above, and recommends training delivery using the following modes:

- *Formal Classroom Instruction* – instructor-led, face-to-face training delivered to small or large groups of acquisition professionals typically at a destination in which the institution or training vendor has control (e.g., college campus, vendor's headquarters, etc.). The training may also be delivered "on-site" at the trainee's place of work, or some nearby location (e.g., hotel conference room). Classroom instruction allows for live instructor and peer collaboration.
- *Live Webinars* – represent an effective solution for delivering instructor-led training to small or large groups of acquisition professionals without the expenses associated with scheduling, travel, and print materials. Webinars also offer opportunities for instructor-learner collaboration through various modes such as chat functions, poll features, information sharing, hands-on labs, breakout sessions, Q&A sessions, teleconference, and other on-line learning tools/features.
- *Recorded Webinars*– Recordings of live webinars can serve as a podcast to be viewed by the learner anytime, anywhere. Webinar training assessment mechanisms provide learner assessment and feedback useful in determining the effectiveness of the training.
- *Web-based Courseware Modules* – Self-paced modularized courseware that incorporates the use of static and interactive media to illustrate the instructional concepts and stimulate learner comprehension. Media examples include graphic supports, flash objects, animations, and audio/video.. An electronic community for learning support and

exchange of ideas and professional experiences (e.g., DAU Acquisition Community Connection) is recommended to further engage learners and support discovery learning styles.

CEU Modules – Continuing Education Units (CEUs) are critical elements of supporting the life-long learning continuum of an acquisition professional. An established CEU program would allow acquisition professionals to meet continuing education requirements and keep abreast of ever changing software acquisition management and engineering practices. The proposed series of CEU modules would serve as refresher training and could be delivered via a variety of delivery options including, webinars, podcasts, web-based courseware modules, conference tutorials, etc. It is important to note that continuous module updates would be the key to the success of the SPII CEU program.

9.0 Recommendations

1. Augment current DAWIA training requirements with software acquisition training tailored to specific acquisition disciplines to improve the awareness of software acquisition principles and issues for the entire acquisition workforce (training for the generalists).

2. Identify a small group of experts from each acquisition discipline to receive more in-depth software related training than the general acquisition workforce. This specialized training could result in advanced degrees and/or private industry certifications.

3. Review the competencies in Appendix B with representatives from the SATEWG then have the competencies validated by the FIPT's from the respective acquisition communities. Ultimately changes may be recommended to DAU courses and career certifications therefore the recommendations need to be joint not just Navy.

4. Establish a process to receive input from the "front lines" of the acquisition workforce to determine if software acquisition training is adequate.

5. Establish a formal and repeatable competency identification, validation, and accreditation process to periodically review and maintain the currency of competencies. In addition, establish a formal and repeatable training gap analysis process to ensure courses are updated to address the latest requirements in software acquisition.

6. Leverage the ongoing CNA and AT&L competencies studies whenever possible.

7. Determine if using the same competencies for all acquisition disciplines and using the Blooms Taxonomy to identify the level of understanding as done in the SMRT report is valid or should each acquisition discipline have its own unique set of competencies.

8. Identify software knowledge requirements, experience requirements and responsibilities for key software-intensive acquisition positions. This will allow acquisition personnel assigned to those positions to be trained before they arrive to the position. The goal is to minimize on-the-job-training.

9. Task course managers to determine which existing courses can satisfy the validated list of competencies for each acquisition discipline. Develop new courses only as a last resort.

10. Establish a software acquisition career-long learning environment which involves mentoring programs, workshops, distance learning, certifications and communities of practice. Provide on-line distance learning using a variety of training media that allows just-in-time training vice the current just-in-case training paradigm.

11. Institutionalize the tenets of SPII by establishing a certification path for a small group of experts within each of the acquisition disciplines. Certifications from private industry may be able to serve as the certifying authority, e.g., the Software Engineering Institute.

12. Establish a software professional designation and develop an incentive plan to encourage acquisition professionals to achieve the designation.

13. Conduct a training media analysis study to identify the most efficient media to deliver training material.

14. Establish performance metrics to identify the improvement in software acquisition resulting from the changes in software acquisition training.

15. Establish a feedback mechanism (e.g., on-line surveys) to collect and analyze data from the acquisition workforce on their opinions of software related training (e.g., effectiveness, relevancy to the job, availability, delivery mode, requirements in career path, etc.) and other SPII interventions.

16. Identify software acquisition continuous learning modules, conferences, workshops, and other learning events for acquisition professionals to satisfy the 80 hour (e.g., CLPs, CEUs) biannual continuing education requirement established by DAWIA.

17. Build experience bases, software communities of excellence, preferred processes, and tools and make them available to the acquisition workforce. .

18. Consider establishing a software engineering specialty track for DoD acquisition personnel.

19. Ensure software-intensive program teams have both systems engineering and software development expertise.

20. Resurrect the capability of the Five Vector Model which looked at the gaps between an individual's current software acquisition training and the training required for a software intensive job. The gap analysis facilitated the creation of an individual development plan which identified the particular software related courses an individual must take to be qualified for the position.

10.0 References

1. Software Management Review Team (SMRT) 1996 Report
2. 2006 Clinger-Cohen Core Competencies
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3. Defense Acquisition Guidebook (Chapter 4: Systems Engineering)
    - https://akss.dau.mil/dag/GuideBook/PDFs/Chapter_4.pdf
4. 2004 AT&L Competency Workbooks
    - https://acc.dau.mil/CommunityBrowser.aspx?id=39310&lang=en-US
5. DAWIA Certification Requirements (DAU 2007 Catalog)
    - http://www.dau.mil/catalog/cat2007/Cat%20Front%20Feb%2022%2007.pdf
6. New DAU Core Plus Framework (DAU 2008 Catalog)
7. USAF Program Management Guidelines
    - http://www.stsc.hill.af.mil/resources/tech_docs/gsam4.html
8. 2007 AT&L Human Capitol Strategic Plan v. 3.0
    - https://acc.dau.mil/CommunityBrowser.aspx?id=118508&lang=en-US
9. AT&L Workforce Resources Position Category Descriptions (PCDs)
    - http://www.dau.mil/workforce/PCDs.asp
10. U.S. Code (Cite 10USC1721): Designation of acquisition positions
    - http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+10USC1721
11. DoD Directive 500.52 (Jan. 12, 2005) Defense Acquisition Technology, and Logistics Workforce Education and Career Development Program
    - http://www.dtic.mil/whs/directives/corres/pdf/500052p.pdf
12. SECNAVINST 5300.36 DoN Position Categories and Career Fields
    - http://acquisition.navy.mil/content/download/1086/4894/file/INDEX_4.pdf

13. Relevant Curricula, Course Descriptions and Learning Objectives

- Defense Acquisition University (DAU)
- Air Force Institute of Technology (AFIT)
- Software Engineering Institute (SEI)
- NASA Information Systems Division (ISD)
- Naval Postgraduate School (NPS)

14. Subject Matter Experts

- NAVAIR Orlando Legal Counsel
- NAVAIR Orlando Primary Contracting Officer
- NAVAIR NCCS Certified SEI Instructor
- DAU Director Center for Engineering & Technology
- NPS Sr. Lecturer Department of Program Management and Acquisition
- AFIT Director Software Engineering Management

Appendix A: List of Courses Reviewed

A-1 DAU Courses

- ACQ 101: Fundamentals of Systems Acquisition Management
- ACQ 201A: Intermediate Systems Acquisition, Part A
- ACQ 201B: Intermediate Systems Acquisition, Part B
- BCF 208: Software Cost Estimating
- CON 100: Shaping Smart Business Arrangements
- CON 110: Mission Support Planning
- CON 111: Mission Planning Execution
- CON 120: Mission Focused Contracting
- CON 214: Business Decisions for Contracting
- CON 215: Intermediate Contracting for Mission Support
- CON 216: Legal Considerations in Contracting
- CON 217: Cost Analysis and Negotiation Techniques
- CON 218: Advanced Contracting for Mission Support
- CON 353: Advanced Business Solutions for Mission Support
- IRM 101: Basic Information Systems Acquisition
- IRM 201: Intermediate Information Systems Acquisition
- LOG 101: Acquisition Logistics Fundamentals
- LOG 102: Systems Sustainment Management Fundamentals
- LOG 201A: Intermediate Acquisition Logistics, Part A
- LOG 201B: Intermediate Acquisition Logistics, Part B
- LOG 203: Reliability & Maintainability
- LOG 204: Configuration Management

- LOG 235A: Performance Based Logistics, Part A
- LOG 235B: Performance Based Logistics, Part B
- LOG 304: Advanced Life Cycle Logistics
- SAM 101: Basic Software Acquisition Mgt
- SAM 201: Intermediate SW Acquisition Mgt
- SAM 301: Advanced SW Acquisition Mgt
- SYS 101: Fundamentals of Systems Planning, Research, Development, and Engineering
- SYS 202: Intermediate SPRDE, Part I
- SYS 203: Intermediate SPRDE, Part II
- SYS 302: Technical Leadership in System Engineering
- TST 101: Intro to Acquisition Workforce Test & Evaluation
- TST 102: Fundamentals of Test & Evaluation (2008)
- TST 201: Intermediate Test & Evaluation
- TST 203: Intermediate Test & Evaluation (2008)
- TST 301: Advanced Test & Evaluation
- TST 302: Advanced Test & Evaluation (2008)

A-2 DAU Continuous Learning Modules

- CLC 033: Contract Format and Structure for the DoD e-Business Environment
- CLE 003: Technical Reviews
- CLE 012: Naval Open Architecture
- CLE 015: Continuous Process Improvement Familiarization
- CLE 020: Enterprise Architecture
- CLE 023: Modeling & Simulation for Test & Evaluation (or CLE 011 prior to 10/1/07)
- CLL 008: Designing for Supportability in DoD Systems
- CLL 011: Performance Based Logistics

- CLM 022: Intro to Interoperability
- CLM 029: Net-Ready Key Performance Parameter

A-3 AFIT

- CSE 479: Software Project Initiating and Planning
- CSE 480: Software Project Monitoring and Control
- CSE 481: Intro to SW Engineering
- SYS 130: Intro to CMMI
- SYS 165: Intro to Risk Management

A-4 Other Courses

- NAVAIR CMMI
- SEI CMMI

Appendix B: Competencies

B-1 Program Management

B-1.1 Level I Program Management

Software Acquisition Management Regulatory/Technical Framework Application & Analysis
Give examples of best system strategies for SW intensive systems
Explain the effect of current system Strategies on SW Acquisition Mgmt
Summarize the strengths and weaknesses of current strategies
Explain the impact of acquisition strategy on SW project planning and SW Engineering methods
Explain the impact of Acquisition Reform
Describe the functions of a DoD acquisition strategy and the elements included in a software acquisition.
Describe components of a [Software Acquisition] strategic plan.
Identify the contents of a [Software Acquisition] plan and explain where the information can be obtained.
Identify higher guidance and [Software Acquisition] goals for strategic planning.
Knowledge of laws, policies, regulations, directives, and guidance impacting DoD [Software Acquisition], including DoD and service specific [Software Acquisition].
Identify the major DoD acquisition policies that apply specifically to software acquisition management and software engineering.
Describe the integrated architecture framework; the relationships and roles of the DoD operational, systems, and technical architectures; and the impact of these architectures on the [Software] acquisition process.
Recognize software and system architectures.
Describe the fundamentals of the DoD Architecture Framework (DoDAF) and address the development, use, governance, and maintenance of architecture data.
Describe the program manager's role is managing architecture products and documentation.
Identify and describe basic principles of technical standards as they relate to system development and interoperability.
Identify interoperability terminology, the importance of planning for interoperability in a [Software] acquisition strategy, and the conceptual components of a [Software] system architecture; and demonstrate the relationship to interoperability.
Describe the software Architecture/reuse relationship
Describe risk mitigation through reuse
Identify reuse guidance
Describe domain specific reuse paradigm
Identify existing Reuse repositories
Describe contracting mechanisms for reuse
Describe the impact of Open Systems on software reuse
State COTS/Reuse Issues
Describe portability, through platform independence
Software Risk Management Application & Analysis
Explain software Risk Analysis
Give examples of software Risk management issues (planning, etc.)
Explain varying risk profile through life cycle
Give examples of organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)
Give examples of risk Management guidance
Summarize the concept of a Domain Competent Work Force
List and explain the steps of a risk management process for a [Software] acquisition.
Explain the purpose and at least one method for analyzing alternatives.
Identify software engineering risks.
Identify software risk management methodologies.
Describe techniques for attaining safe, secure, and reliable systems.
Explain how to incorporate risk management strategies into software project planning and management.
Compare and contrast the commonly accepted standards, tools, and methods used in risk management.
Explain how to monitor the status of software engineering risks and common SW risk management issues.
Define Software Security
Describe Security Risk Management
Identify Software security guidance (regulations, standards, "orange book")
Describe System Certification
List contemporary security developments
Describe the discipline of Software Safety
Government and Industry Software Acquisition Management roles
Give examples of standards for Configuration Mgt
Summarize Configuration Mgt Planning
Explain the use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)
Explain the synchronization of HW and SW baselines
Explain Configuration Management CASE tools
Explain the management of Configuration Risks
Explain the purpose for configuration management (CM) and at least four CM functions.

Explain the purpose for tracing and managing the configuration of requirements.
Summarize Staffing best practices.
Summarize Organizational best practices
Summarize best practices for Matrix Support Groups
Summarize Resource Management best practices
Summarize best practices for Project Control
Summarize best practices for Project Tracking
Explain End User Involvement
Summarize best practices for IPT's and working groups
Summarize best practices for Intergroup Coordination
Give examples of Corrective Actions
Give examples of Lessons Learned
Summarize best practices to deal with Management Issues
Explain the use of teams in managing [Software] acquisition programs and the concepts of team building.
Describe [Software] systems and methods for facilitating all aspects of program management.
Define organizational and individual roles and responsibilities involved in DoD software acquisition.
Reference sources for software acquisition and information technology management policies, standards, and best practices.
Reference sources for software acquisition and information technology management policies, standards, and best practices.
Describe the impact, roles and opportunities of the DoD Science & Technology Process (e.g. Advanced concept Technology Demonstrations (ACTD) and Advanced Technology Demonstration (ATD).
Unique Software Procurement Requirements Application & Analysis
Explain the development of SW Development Plan (SDP)
Explain the use of SDP in proposal evaluation
Explain the Work Break-down Structure (WBS) for SW
Give examples of Laws/regulation related to SOW and RFP
Give examples of Quality Issues
Explain Contract types and their strengths and weaknesses (for all types of systems)
Give examples of Deliverables (issues and tradeoffs)
Explain the SW portion of Proposal Evaluation
Summarize data and intellectual property rights
Give examples of Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse
Distinguish Model SOWs
Reference sources of DoD policy and guidance on the procurement of intellectual property, including software.
Identify the role and elements of electronic commerce in [Software Acquisitions].
Define commercial items and non-developmental items, and explain the commercial items acquisition process.
Describe solicitation methods, format, and content and explain the roles of the communications-computer acquisition professional in the solicitation process.
Identify the contents of a statement of work/statement of objectives and list sources that would help in their development.
Explain the role of evaluation criteria in a [Software Acquisition].
Describe a [Software Acquisition] source selection process.
Define contract administration and identify the contract administration responsibilities of various Government officials and organizations for a [Software Acquisition].
Identify the policies, procedures, and management techniques used to establish contract support capabilities for software-intensive systems.
Describe appropriate activities to ensure data rights and intellectual property policies are implemented successfully.
Describe Open System Migration issues
Identify applicability of Naval Open System architecture policy and guidelines
Identify applicability of Open System architecture policy and guidelines
Identify Open System guidance (Application Portability Profile, regulations, standards)
Describe Open System adaptation effect on acquisition
Identify Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues
Software Metrics Application & Analysis
Describe the Roles of assessments/evaluations
Identify methods available to assess maturity
Describe the strengths and weaknesses of current methods
Describe the applications of assessments and evaluations
Describe the role of evaluations/assessments in contracting
Identify best practices for the frequency of evaluations/assessments
Describe the responsibilities for evaluations/assessments
Explain the impetus behind the process improvement focus.
Describe the structure of the Staged and Continuous representations of CMMI.
Describe the general guidelines for selecting either the Staged or Continuous representation
Identify the content of the CMMI Process Areas
Explain where to find more detailed information on applying CMMI
Identify appropriate metrics for visibility into development process, software product, system progress
Describe metrics Collection methodologies
Identify best practices for Metrics Interpretation

Describe bench marking practices
Describe data management technologies and methods for DoD [Software Acquisition] programs.
Explain the types and use of measures/metrics in a [Software] acquisition.
Analyze Software Technical Life Cycle & Relate it to System Acquisition Process
Identify current approaches (e.g., Functional, Object-Oriented)
Describe strengths and weaknesses of design approaches
Describe the effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs
Identify Software Design Guidance (laws, regs, Stds)
Define Technical fundamentals
Identify Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions
List criteria for Paradigm selection
Describe the risks and benefits of each development
Describe paradigm selection resource/management issues
Recognize software measures, development models, paradigms, and strategies appropriate for use in software-intensive acquisitions.
Define key [Software] systems and software engineering terms, concepts, and methodologies.
Describe how the eight technical processes can be applied in top-down development and bottom up product realization.
Describe how the eight technical management processes are used to control and assess systems engineering (SE) activities.
Describe the role of a systems model, the work breakdown structure (WBS), standards, top-down design, bottom-up product realization, and the Systems Engineering Plan (SEP).
Describe the role SE management plays in acquisition programs.
Explain the relationship between software engineering and systems engineering.
Describe the SE process and its application throughout a system's life cycle.
Explain the importance of rigorously applying SE principles and practices.
Explain the relationship of the software development life cycle to the overall system acquisition process.
Recognize the complexity of the software development process to the acquisition life cycle.
Identify Cost Factors
List key Software support transition issues
Describe Organic/Outsourcing Post Deployment Software Support considerations
Describe considerations for Software Engineering Environment acquisition & use
Identify DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)
Describe Support Organization Involvement
Define Continuous process improvement
Describe End User Involvement
Describe Corrective Actions Management
Define Contract Baseline
Describe the relationship with contractor(s)
Identify DoD [Software Acquisition] Management regulations, goals, and procedures.
Describe [Software Acquisition] life cycle budget execution goals and objectives.
Identify the concepts of change management.
Describe examples of the technical, contractual, and personal issues involved in deploying a [Software] system.
Identify [Software Acquisition] Life Cycle Management documentation requirements.
Recognize the importance of supportability to achieving system readiness requirements and reducing life-cycle costs.
Discuss supportability requirements that must be met prior to acquisition or modification of a new/existing [software-intensive] system.
Explain the support activities and requirements associated with fielding/deployment and post-production support of software-intensive systems.
Identify key software support transition issues.
Define Joint Technical Architecture (JTA) [or its equivalent, e.g., DoDAF]
Describe considerations in domain & product line engineering
Identify state of the art software technology topics
Explain at least two [Software] technologies relative to DoD systems development.
Describe how modeling and simulation (M&S) can benefit over the entire life cycle of a software-intensive acquisition project.
Recognize the integral nature of systems software in modern defense systems and the policies applicable to software intensive systems.
Indentify and describe modeling and simulation approaches.
Software Testing "Best Practices" Application
Define IV&V, and describe benefits and disadvantages
Identify IV&V levels
Identify IV&V guidance
Describe the IV&V relationship to risk management and testing
Describe the IV&V effect on development schedule
Describe the discipline of Software Verification, Validation, and Accreditation (V,V&A)
Give examples of software quality factors
Give examples of software quality guidance
Explain quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)
Explain the benefits and risks associated with software quality methods
Give examples of best practices for Software Project Management visibility into software quality (metrics and inspections)
Give examples of Software Product Assessment Techniques

Summarize Software Quality Assurance Planning and Techniques
Identify requirements, methods, and techniques for quality assurance during the system life cycle.
Describe the discipline of software Quality
Software Acquisition Management Planning & Status Documentation analysis
Define Software Requirement management
Identify Requirement Management guidance
Describe Requirement Management responsibilities
Describe User involvement
Identify Requirement Planning issues
Identify types of requirements (derived, explicit, decomposed)
Define software requirements, and describe the benefits and risks of prototyping
Describe Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)
Describe Requirements/COTS issues
Identify Critical measures of effectiveness for operational issues and criteria
Describe the requirements development process.
Define software acquisition and information technology management-specific terms and concepts.
Describe the Government management of reviews and audit process
Identify high interest Software issues and their indicators
Describe Critical Software life cycle reviews
List key Software review questions and data
Identify Entrance & Exit Criteria
Describe the Software review relationship to system reviews
Software Economic Factors analysis
Describe the strengths and weaknesses of methods and models used for SW cost & schedule estimation
Describe SW cost & schedule reporting
Describe the validation/assessment of fidelity of cost and schedule estimates for SW intensive projects
Identify Life Cycle Costs (incl PDSS)
Identify elements of Planning, Programming, and Budgeting System (PPBS).
Explain the requirements and factors involved in assessing program costs and returns.
Identify the purpose and process of Earned Value Management (EVM) and Recognize the value and benefits of EVM in the software acquisition process.
Describe the requirements for conducting an economic analysis for a [Software] system in the DoD Life Cycle Management process. Identify examples of the factors included in an economic analysis for a [Software] system.
Explain the role, process, and elements of market research in a [Software Acquisition].
Define Business Process Reengineering (BPR)
Identify best practices for adapting maturing technologies
Define the Development Information System/Enterprise
Identify FPI Guidance, Process, Tools
Describe Model Relationship
Describe the impetus behind the process improvement focus.

B-1.2 Level II Program Management

Software Acquisition Management Regulatory/Technical Framework Application & Analysis
Give examples of best system strategies for SW intensive systems
Explain the effect of current system Strategies on SW Acquisition Mgmt
Summarize the strengths and weaknesses of current strategies
Explain the impact of acquisition strategy on SW project planning and SW Engineering methods
Explain the impact of Acquisition Reform
Using a software-intensive system, identify acquirer key planning roles and activities. Describe "best practices" for software-intensive systems acquisitions and development that acquirers may use.
Given descriptions of acquisition strategies, issues, risks, software-intensive system, select an appropriate acquisition strategy over the life cycle of the system; select an appropriate software development paradigm within that strategy; explain how modeling, simulation, and prototyping help with this process.
Given materials on applicable Federal laws and DoD acquisition policies, determine legal and policy requirements that apply to a given software-intensive system
Include COTS-based systems where appropriate when formulating software acquisition strategies.
For current laws and policies, identify key software acquisition management activities that should be emphasized during the acquisition of a DoD software intensive system.
Summarize Software Architecture Fundamentals
Explain the relationship of SW to System Architecture
Explain the relationship of Architecture to SW Design
Explain the Impact of architecture on interoperability and reuse
Distinguish between C3I, MCCR, and AIS systems
Summarize best practices for evaluating and acquiring target environments
Give examples of product line & domain engineering considerations (tradeoffs & analysis)
Explain the differences among documentation frameworks (e.g., the Federal Enterprise Architecture Framework (FEAF), the Department of Defense Architecture Framework (DODAF), or the Zachman Framework) and architecture reference models such as those provided in the Federal Enterprise Architecture (FEA).
Describe basic architecture documentation (i.e., work product) methodologies at each level of a commonly used framework (e.g., Zachman, FEAF or DODAF).
Identify the purpose and timing of the SE process outputs over the life cycle, such as program-unique specifications, IT architectures, technical data packages, and other system-specific information.
Give examples of Interoperability and Data Administration Issues
Summarize Interoperability and data administration guidance (Laws, regulation, and standards)
Explain the relationship of Software/System Architecture and interoperability
Explain the Software Architecture/reuse relationship
Explain risk mitigation through reuse
Summarize reuse guidance
Explain Domain specific reuse paradigm
Give examples of existing Reuse repositories
Explain contracting mechanisms for reuse
Explain the impact of Open Systems on software reuse
Give examples of COTS/Reuse Issues
Explain portability, through platform independence
Software Risk Management Application & Analysis
Demonstrate Software Risk Analysis
Solve Software Risk management issues (planning, etc.)
Demonstrate the benefit of varying the risk profile through life cycle
Select Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.) appropriate to a given case situation
Use Risk Management guidance
Summarize the concept of a Domain Competent Work Force
Given programmatic documentation for a given software-intensive system, justify appropriate risk handling methods for that system.
Using a software acquisition system, apply the risk management process as a basis for making sound software acquisition program decisions.
Identify software engineering risks and apply appropriate software risk management methodologies
Incorporate risk management strategies into software project planning and management.
Give examples of Software security considerations
Summarize Security Risk Management
Summarize Software security guidance (regulations, standards, "orange book")
Explain System Certification
Give examples of contemporary security developments
Given a notional software-intensive system, describe software information assurance requirements appropriate to the overall development and acquisition of that system.
Given information about a software-intensive system, identify software safety and reliability issues for the system.
Government and Industry Software Acquisition Management roles
Utilize Standards for Configuration Mgt
Demonstrate Configuration Mgt Planning
Demonstrate the use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)
Demonstrate the synchronization of HW and SW baselines
Utilize Configuration Management CASE tools
Demonstrate the management of Configuration Risks

Identify the role and functions of configuration management in the acquisition process.
Given a software-intensive system, select software configuration management (CM) activities and issues that are appropriate to the various development phases of a software-intensive system.
Explain the fundamentals of Configuration Management (CM) in software systems.
Demonstrate Staffing best practices.
Demonstrate Organizational best practices
Demonstrate best practices for Matrix Support Groups
Demonstrate Resource Management best practices
Demonstrate best practices for Project Control
Demonstrate best practices for Project Tracking
Demonstrate End User Involvement
Demonstrate best practices for IPT's and working groups
Demonstrate best practices for Intergroup Coordination
Select Corrective Actions
Utilize Lessons Learned
Demonstrate best practices to deal with Management Issues
Given background materials on ISAM course competencies and DoD Acquisition environment, relate ISAM lesson topics to individual learning needs and describe the typical roles played by software management professionals.
Describe the role of the project manager is software project initiating and planning.
Compare the roles and responsibilities of the systems engineering effort across government and contractor boundaries (e.g., Chief Engineer, Lead Systems Engineer, IPT members, etc.) has in regards to the implementation of systems engineering and software engineering.
Interact with software program integrated product teams regarding the application of the systems engineering process to their respective area of expertise.
Unique Software Procurement Requirements Application & Analysis
Prepare a SW Development Plan (SDP)
Use a SDP in a proposal evaluation
Prepare a Work Break-down Structure (WBS) for SW
Select Laws/regulation related to SOW and RFP
Prepare solutions for Quality Issues
Select Contract types based on their strengths and weaknesses (for all types of systems)
Select Deliverables (based on issues and tradeoffs)
Demonstrate a SW Proposal Evaluation
Incorporate Data and intellectual property rights
Incorporate Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse
Prepare Model SOWs
Describe the role of contracts in software acquisition management and software engineering.
Given a software-intensive system and a systems-level acquisition strategy, choose key practices considered essential to contracting for such a system; and identify key activities, tasks, and criteria considered essential for effective proposal evaluation and selection of the best-qualified contractor for that system.
Summarize the role of contracting in the software acquisition process and the major contractual contributions towards managing program risk.
Analyze given proposals and select the best-qualified contractor for a given software-intensive system acquisition.
Analyze given proposals and requirements and select the best-qualified contractor for the acquisition of software development services.
Develop a plan to implement data rights and intellectual property policies within a software-intensive acquisition program.
Give examples of Open System Migration issues
Identify applicability of Naval Open System architecture policy and guidelines
Identify applicability of Open System architecture policy and guidelines
Summarize Open System guidance (Application Portability Profile, regulations, standards)
Explain Open System adaptation effect on acquisition
Give examples of Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues
Given system requirements and a software application domain, assess life cycle impacts and risks of using COTS and NDI/GOTS as part of computer resource planning and support.
Software Metrics Application & Analysis
Explain the roles of assessments/evaluations
Demonstrate methods available to assess maturity
Distinguish the strengths and weaknesses of current methods
Demonstrate different applications of assessments and evaluations
Demonstrate the role of evaluations/assessments in contracting
Select the frequency of evaluations/assessments
Summarize responsibilities for evaluations/assessments
Compare the three CMMIs - Development, Acquisition, and Services - and their intended environments.
For each PA in maturity levels 2 and 3, describe the typical activities and typical work products that can be expected in an organization that has implemented processes consistent with the PA
Compare and contrast the Software CMM and the CMMI
Explain how CMMI Process Areas (PA) relate to a software or systems engineering life cycles
Describe the CMMI's basic structure and components.
Explain the meaning of capability levels and maturity levels.
Describe the interrelationships between CMMI components.
Identify the CMMI Process Areas.
Locate relevant information in CMMI models.

Describe the environments for which CMMI is best suited.
Describe the role of CMMI-based process discipline in acquisition environments.
Explain the use of process and CMMI appraisals in acquisition.
Identify best practices in using statistics and measures to quantify, plot, and analyze software development in order to manage and improve software acquisition processes.
Select appropriate metrics for visibility into development process, software product, system progress
Select metrics collection methodologies
Demonstrate Metrics Interpretation
Demonstrate Bench marking practices
Develop a Measurement Plan and establish baseline measures.
Evaluate project/program performance metrics as indicators of problems in software-intensive acquisition programs.
Analyze Software Technical Life Cycle & Relate it to System Acquisition Process
Distinguish among current approaches (e.g., Functional, Object-Oriented)
Explain the strengths and weaknesses of design approaches
Explain the effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs
Summarize Software Design Guidance (laws, regs, Stds)
Summarize technical fundamentals
Distinguish among Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions
Give examples of criteria for Paradigm selection
Explain the risks and benefits of each development
Summarize paradigm selection resource/management issues
Describe approaches to creating and documenting the structure of a software system.
List common programming or scripting languages.
Using a software-intensive system and software development planning information, identify key practices that can be used by developers to create a quality software product.
Given a software-intensive system and a draft software development plan, analyze the plan for sufficiency and coverage of project specific software acquisition and development issues.
Describe the concept of agile software development.
Given software-intensive system requirements and current DoD policies, assess the impacts of DoD interoperability policies, requirements, applicable architectures and open systems concepts on the acquisition, development, and support of a software-intensive system.
Given requirements documents, acquisition strategy information, risk assessments, and other programmatic documentation for a software-intensive system, develop a feasible build plan for the system.
Explain the importance of accounting for maintenance in software acquisition and development.
Describe the similarities between software maintenance and software development.
Estimate the maintenance effort involved in a software system and evaluate risks associated with continued maintenance vs. redevelopment.
Explain Cost Factors identification
Summarize Key Software support transition issues
Summarize Organic/Outsourcing Post Deployment Software Support considerations
Summarize considerations for Software Engineering Environment acquisition & use
Summarize DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)
Give examples of Support Organization Involvement
Explain continuous process improvement
Give examples of End User Involvement
Explain Corrective Actions Management
Explain Contract Baseline
Explain the relationship with contractor(s)
Explain how software acquisition activities impact and relate with other functional areas within the software acquisition life cycle.
Describe software lifecycle models.
Describe the phases of the software development life cycle to include requirements analysis, design, implementation, test & evaluation, and maintenance.
Describe key logistics support elements to consider in software product support/sustainability planning and management
Given a software-intensive system in the latter stages of development, identify key issues for deploying it, transitioning its maintenance, and disposing of it.
Distinguish between system development life cycle and the system life cycle.
Select appropriate software lifecycle models for a given system.
Justify the importance of software supportability to achieving system readiness requirements.
Given a software acquisition system, identify critical program management and logistics decisions concerning software system supportability issues and alternatives that would optimize software system design for supportability.
Explain Joint Technical Architecture (JTA) [or its equivalent, e.g., DoDAF]
Explain Domain & product line engineering
Explain state of the art software technology topics
Compare and contrast, in the changing DoD environment, the impacts of major institutional players, major new software acquisition initiatives, and policies specific to defense software acquisition management.
Compare and contrast among modeling and simulation tools, demonstrating that the tools chosen appropriately offer productivity, reliability, availability, and accessibility in support of the organization's missions.
Software Testing "Best Practices" Application
Summarize IV&V definition, benefits, and disadvantages
Explain how to determine IV&V levels
Summarize IV&V guidance

Explain IV&V relationship to risk management and testing
Explain IV&V effect on development schedule
Describe the differing roles of validation, verification, and testing
Explain how V&V and testing fits in the software lifecycle
Identify different V&V techniques and tools
Outline Software quality factors
Outline Software quality guidance
Illustrate Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)
Illustrate the benefits and risks associated with software quality methods
Illustrate best practices for Software Project Management visibility into software quality (metrics and inspections)
Outline Software Product Assessment Techniques
Outline Software Quality Assurance Planning and Techniques
Explain the fundamentals of Software Quality Assurance in software systems.
Interpret evaluations on the quality of software based on factors such as modularity, maintainability, complexity, and algorithm analysis.
Describe the different meanings of software quality and their associated measures.
Distinguish Software testing Phases (DT&E, F/OT&E)
Give examples of appropriate Testing metrics (software maturity, error density)
Give examples of types of Testing (unit, FOT, integration, DT/OT).
Summarize Software integration testing issues
Explain sufficient software testing
Explain Test and Evaluation Master Plan relationship to Testing
Explain High Integrity Systems
Explain the identification of Testing Risks
Describe the discipline of Software Reliability
Describe the different types of Test and Evaluation (T&E), the organizations responsible for them, and the reason for heavy DoD commitment to T&E.
Describe key software testing and evaluation elements to consider in software acquisition management and software engineering.
Given previous instruction on software testing and a software-intensive system, assess software and system test processes for effectiveness.
Discuss available tools, techniques, and metrics for software testing.
Explain how to incorporate software testing and evaluation elements into software project planning and management (Pareto's law and the impact of core requirements - i.e., 80% of the design and testing is up front before coding begins).
Software Acquisition Management Planning & Status Documentation analysis
Summarize Software Requirement management
Summarize Requirement Management guidance
Summarize Requirement Management responsibilities
Explain User involvement
Give examples of Requirement Planning issues
Distinguish among the types of requirements (derived, explicit, decomposed)
Give examples of software requirements, and describe the benefits and risks of prototyping
Give examples of Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)
Give examples of Requirements/COTS issues
Explain Critical measures of effectiveness for operational issues and criteria
Given a software-intensive system within an application domain, select appropriate software requirements management methodologies and techniques.
Summarize the Government management of reviews and audit process
Give examples of high interest Software issues and their indicators
Summarize Critical Software life cycle reviews
Give examples of key Software review questions and data
Give examples of Entrance & Exit Criteria
Explain the Software review relationship to system reviews
Software Economic Factors analysis
Select methods and models for SW cost & schedule estimation based on their strengths and weaknesses
Demonstrate SW cost & schedule reporting
Demonstrate validation/assessment of fidelity of cost and schedule estimates for SW intensive projects
Predict Life Cycle Costs (incl PDSS)
Given knowledge of the software cost and schedule cost estimating process, assess techniques that can be used in preparing cost and schedule estimates for software-intensive systems.
Given various cost estimating tools and summary information about a software-intensive system, develop an initial cost and schedule estimate for that system.
Given cost estimation tools and preliminary software development cost and schedule estimates for a software-intensive system, justify an appropriate "should cost" estimate for that system.
Describe the basics of software size and effort estimates.
Describe the basics of creating and monitoring software schedules.
Using EVM principles, create detailed work assignments and initialize a metrics tracking system.
Determine an appropriate cost-estimating methodology and the types of data required for a software cost estimate.
Identify and appropriately apply models for software life-cycle cost estimating
Compare and contrast alternative techniques for software cost estimating.
Describe and apply software cost-estimating techniques.
Discuss the strengths and weaknesses of software cost-estimating models.
Discuss major influences on software cost estimating.

Translate software cost estimates into acquisition program budgets.
Explain the major activities involved in evaluating and/or negotiating contract proposals.
Explain the major activities in conducting market research on a commercial software product to determine product availability and applicability.
Explain Business Process Reengineering (BPR)
Explain best practices for adapting maturing technologies
Describe the Development Information System/Enterprise
Give examples of FPI Guidance, Process, Tools
Explain Model Relationship
Describe the impetus behind the process improvement focus.
Explain the program manager's role and responsibilities in software process improvement.
Explain process improvement and CMMI roles and responsibilities.
Describe the impact of leadership in acquisition and process improvement.
Describe the value or benefits of model-based process improvement.
Describe different process models/methods to apply, and explain how and when to achieve process improvement.
Explain the cost of process improvement investment in project or product delivery.
Explain how to measure and report process improvement.
Describe the knowledge/skills necessary to effectively apply to process improvement.
Demonstrate the value of establishing periodic and timely reviews and reporting milestones in which [the software system] performance is evaluated against the [software system] plan.
Given programmatic documentation and project-specific measurement data for a software-intensive system, select and analyze performance measures appropriate to the system's acquisition life cycle; appraise tools and techniques available to the program office for planning, measuring and predicting software development, quality and process maturity.

B-1.3 Level III Program Management

Software Acquisition Management Regulatory/Technical Framework Application & Analysis
Discriminate best system strategies for SW intensive systems
Analyze the effect of current system Strategies on SW Acquisition Mgmt
Illustrate the strengths and weaknesses of current strategies
Outline the impact of acquisition strategy on SW project planning and SW Engineering methods
Outline the impact of Acquisition Reform
Summarize the strengths and weaknesses of incorporating software product reuse and Commercial Items products into the acquisition strategy of an information intensive system.
Evaluate software acquisition methodology for its ability to support an acquisition strategy.
Employ software acquisition strategies that are characterized by progressively defining requirements and associated design solutions based on evolving user needs.
Summarize Software Architecture Fundamentals
Show the relationship of SW to System Architecture
Show the relationship of Architecture to SW Design
Demonstrate the impact of architecture on interoperability and reuse
Differentiate between C3I, MCCR, and AIS systems
Demonstrate best practices for Evaluating and Acquiring target environments
Illustrate product line & domain engineering considerations (tradeoffs & analysis)
Assess the benefits and limitations that implementing a standards based architecture brings to the acquisition strategy for a software intensive system.
For a given system, defend the decision for an "open system" or "closed system".
Give examples of Interoperability and Data Administration Issues
Summarize Interoperability and data administration guidance (Laws, regulation, and standards)
Explain the relationship of Software/System Architecture and interoperability
Assess interoperability issues and their impacts on software acquisition.
Analyze the Software Architecture/reuse relationship
Show Risk mitigation through reuse
Outline Reuse guidance
Outline Domain specific reuse paradigm
Differentiate existing Reuse repositories
Illustrate contracting mechanisms for reuse
outline the impact of Open Systems on software reuse
Outline COTS/Reuse Issues
Illustrate Portability, through platform independence
Software Risk Management Application & Analysis
Illustrate Software Risk Analysis
Outline Software Risk management issues (planning, etc.)
Illustrate the benefit of varying risk profile through life cycle
Select Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.) appropriate to a given case situation
Outline Risk Management guidance
Illustrate the concept of a Domain Competent Work Force
Analyze the causes of cost, schedule, and performance problems in large software efforts.
Critique the contention that a software crisis exists and current strategies for addressing the crisis.
Apply and evaluate commonly used best practices risk management models.
Demonstrate Software security considerations
Demonstrate Security Risk Management
Utilize Software security guidance (regulations, standards, "orange book")
Describe System Certification
Utilize contemporary security developments
Evaluate the impact of security, safety and integrity requirements on the development of an acquisition strategy for software intensive systems.
Apply appropriate program security techniques to a software acquisition program.
Government and Industry Software Acquisition Management roles
Utilize Standards for Configuration Mgt
Demonstrate Configuration Mgt Planning
Demonstrate the use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)
Demonstrate the synchronization of HW and SW baselines
Utilize Configuration Management CASE tools
Demonstrate the management of Configuration Risks
Demonstrate Staffing best practices.
Demonstrate Organizational best practices
Demonstrate best practices for Matrix Support Groups
Demonstrate Resource Management best practices
Demonstrate best practices for Project Control
Demonstrate best practices for Project Tracking
Demonstrate End User Involvement
Demonstrate best practices for IPT's and working groups

Demonstrate best practices for Intergroup Coordination
Select Corrective Actions
Utilize Lessons Learned
Demonstrate best practices to deal with Management Issues
Evaluate the success factors for creating and sustaining cohesive teams within a software organization.
Analyze the organizational and cultural dynamics of program offices and software development teams.
Evaluate the suitability of alternative organization structures, including integrated product teams.
Describe the appropriate skills mix needed to staff a software project.
Unique Software Procurement Requirements Application & Analysis
Analyze a SW Development Plan (SDP)
Analyze a SDP in a proposal evaluation
Analyze a Work Break-down Structure (WBS) for SW
Outline Laws/regulation related to SOW and RFP
Analyze solutions for Quality Issues
Select Contract types based on their strengths and weaknesses (for all types of systems)
Select Deliverables (based on issues and tradeoffs)
Analyze a SW Proposal Evaluation
Incorporate Data and intellectual property rights
Illustrate Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse
Analyze Model SOWs
Design an acquisition philosophy or model that fits the organization's mission, needs, and culture. Among the factors considered include sourcing issues, type(s) of contract, modular contracting, award fees, use of subcontractors, etc.
Analyze the security implications of software assurance, as it applies to confidentiality, and integrity, including legislation dealing with source manufacturing. Include internal GOTS, external COTS, internet/intranet, legacy codes, applicable legislation regarding source manufacturing, and the types of individuals (US trained, foreign national H-1B visa holders, off-shore workforce, etc.) developing software.
Originate a complete solicitation that effectively communicates the software acquisition strategy and factors for award.
Give examples of Open System Migration issues
Identify applicability of Naval Open System architecture policy and guidelines
Summarize Open System guidance (Application Portability Profile, regulations, standards)
Explain Open System adaptation effect on acquisition
Give examples of Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues
Software Metrics Application & Analysis
Outline the roles of assessments/evaluations
Analyze methods available to assess maturity
Illustrate the strengths and weaknesses of current methods
Analyze different applications of assessments and evaluations
Outline the role of evaluations/assessments in contracting
Analyze the frequency of evaluations/assessments
Outline responsibilities for evaluations/assessments
Analyze metrics for visibility into development process, software product, system progress
Analyze metrics collection methodologies
Analyze interpretations of metrics
Analyze bench marking practices
Apply data administration and management elements, initiatives, methods, and technologies to an information systems acquisition program.
Evaluate and select software metrics that will provide insight into program status and facilitate early detection of potential problems.
Analyze Software Technical Life Cycle & Relate it to System Acquisition Process
Select current approaches (e.g., Functional, Object-Oriented)
Select design approaches based on their strengths and weaknesses
Predict the effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs
Use Software Design Guidance (laws, regs, Stds)
Summarize technical fundamentals
Distinguish among Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions
Prepare for Paradigm selection
Select a development paradigm based on the risks and benefits of each
Summarize paradigm selection resource/management issues
Outline SE activities in the context of the various life cycle phases of the Defense acquisition framework.
Analyze the scope of SE and its relationship to other program management functions across the life cycle.
List important design considerations and their impacts
Identify and explain technical processes that can be applied to control and assess systems engineering (SE) activities for software-intensive systems.
Select an appropriate reengineering strategy to implement, develop, and integrate a software intensive system.
Evaluate and manage a SE process to translate requirements into integrated design solutions, ensuring that solutions both meet current requirements and facilitate the incorporation of new technologies and capabilities to meet future needs.
Develop key portions of a Systems Engineering Plan.
Describe and analyze the software development and acquisition process.
Illustrate Cost Factors identification
Outline Key Software support transition issues
Outline Organic/Outsourcing Post Deployment Software Support

Analyze considerations for Software Engineering Environment acquisition & use
Outline DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)
Illustrate Support Organization Involvement
Illustrate Continuous process improvement
Illustrate End User Involvement
Outline Corrective Actions Management
Prepare a Contract Baseline
Explain the relationship with contractor(s)
Evaluate the different parts of the life cycle to achieve a useful and cost effective outcome.
Evaluate acquisition logistics functions and documentation needs over a software system's life cycle, including organic/outsourcing post deployment software issues, and commercial production and support.
Explain Joint Technical Architecture (JTA) [or its equivalent, e.g., DoDAF]
Explain Domain & product line engineering
Explain state of the art software technology topics
Analyze the use of advanced technology tools such as integrated product teams, modeling and simulation, and open systems architectures, to further facilitate management of a developing system.
Evaluate the impact of Congressional and Federal acquisition reform initiatives on acquisition management for software intensive systems.
Assess the impact of current/emerging law upon software acquisition and use.
Formulate and describe strategies to influence Defense software acquisition policies, strategies, plans and procedures.
Evaluate benefits, limitations and tradeoffs of modeling, simulation and prototyping as tools supporting the program life cycle.
Software Testing "Best Practices" Application
Summarize IV&V definition, benefits, and disadvantages
Explain how to determine IV&V levels
Summarize IV&V guidance
Explain IV&V relationship to risk management and testing
Explain IV&V effect on development schedule
Evaluate evidence that a system element meets the defined requirements ("build-to specification) of a given software-intensive system.
Analyze Software quality factors
Modify Software quality guidance
Analyze Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)
Analyze the benefits and risks associated with software quality methods
Create a plan to allow Software Project Management visibility into software quality (metrics and inspections)
Analyze Software Product Assessment Techniques
Create a Software Quality Assurance Plan
Choose appropriate software quality management methodologies based on cost, schedule, and performance risk management considerations.
Differentiate Software testing Phases (DT&E, F/OT&E)
Discriminate appropriate Testing metrics (software maturity, error density)
Discriminate Type of Testing (unit, FOT, integration, DT/OT).
Outline Software integration testing issues
Illustrate sufficient software testing
Outline the Test and Evaluation Master Plan relationship to Testing
Illustrate High Integrity Systems
Illustrate the identification of Testing Risks
Evaluate whether a software testing program adequately supports the quality, mission effectiveness and mission suitability goals of an information intensive acquisition program throughout its life cycle of an information intensive program.
Evaluate methodologies for analyzing, determining, refining, implementing, and testing software intensive system requirements.
Explain the role of testing and evaluation as a feedback mechanism and management tool for the engineering and development of software-intensive systems.
Software Acquisition Management Planning & Status Documentation analysis
Differentiate Software Requirement management from other SW acquisition management practices
Outline Requirement Management guidance
Differentiate Requirement Management responsibilities
Illustrate User involvement
Outline Requirement Planning issues
Differentiate the types of requirements (derived, explicit, decomposed)
Outline Software requirement definition, benefits, and risks of prototyping
Discriminate Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)
Outline Requirements/COTS issues
Analyze critical measures of effectiveness for operational issues and criteria
Based on high-level project requirements, create and execute a software management plan to track and control a software-intensive program.
Analyze the requirements process and its impact on the acquisition process, especially in regards to Initial Capabilities Document (ICD), Capabilities Development Document (CDD), Capabilities Production Document (CPD), Acquisition Program Baseline (APB), and related documents (e.g., Command, Control, Communications, computers and Intelligence (C4I), analysis of Alternatives (AOA), etc.).
Evaluate methodologies for analyzing, determining, refining, implementing, and testing software intensive system requirements.
Outline the Government management of reviews and audit process
Illustrate high interest Software issues and their indicators
Outline Critical Software life cycle reviews
Outline key Software review questions and data

Analyze Entrance & Exit Criteria
Outline Software review relationship to system reviews
Present and defend capstone software acquisition case analysis.
Assess Federal and DoD acquisition initiatives
Originate tailored, value added, program documentation (e.g. Acquisition Program Baseline, Risk Management Plan, cost estimates, test results, etc.).
Design a method to ensure that measurement data that has been collected in the assessment process is used in the review and decision making processes.
Software Economic Factors analysis
Differentiate methods and models used for SW cost & schedule estimation based on their strengths and weaknesses
Outline SW cost & schedule reporting
Illustrate Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects
Outline Life Cycle Costs (incl PDSS)
Evaluate strengths and weaknesses of software cost estimation methods and models.
Evaluate the philosophy, practice, and processes and merits of for determining, refining, and implementing cost as an independent variable (CAIV) and earned value (EV) in managing software intensive systems.
Evaluate, select and apply government and commercial decision tools and evaluation systems used for estimating, measuring, and predicting software cost, schedule and quality as well as in making go/no go decisions.
Describe the ways in which benchmarks may be used to forecast performance of your [software-intensive project/program].
Estimate the risk reserve required for a software intensive system.
Outline Business Process Reengineering (BPR)
Illustrate Adapting maturing technologies
Outline Development Information System/Enterprise
Outline FPI Guidance, Process, Tools
Illustrate Model Relationship
Describe the linkage of technical reviews to technical program management.
Evaluate the impact of selected technologies on the acquisition and development of software-intensive systems.
Assess the revised business orientation reflected in the new DoD acquisition policy.
Examine differences between commercial software acquisition efforts and DoD efforts.
Recognize and selectively adopt commercial best practices.

B-2 SPRDE Systems & Software Engineering Competencies for Levels I, II, and III

SPRDE-SE SMRT Competencies				
Key Competency Area	**Sub-competencies**	**Level I**	**Level II**	**Level III**
		Generalists	Generalists	Generalists
Acquisition Strategies				
	Best system strategies for SW intensive systems	2	3	4
	Affect of current system Strategies on SW Acquisition Mgmt	2	3	4
	Strengths and weaknesses of current strategies	2	3	4
	Impact of acquisition strategy on SW project planning and SW Engineering methods	2	3	4
	Impact of Acquisition Reform	2	3	4
Architecture				
	Software Architecture Fundamentals	0	2	2
	Relationship of SW to System Architecture	0	2	2
	Relationship of Architecture to SW Design	0	2	2
	Impact of architecture on interoperability and reuse	0	2	2
	Differences in C3I, MCCR, and AIS systems	0	2	2
	Evaluating and Acquiring target environments	0	2	2
	Product line & domain engineering considerations (tradeoffs & analysis)	0	2	2
Contracting Issues				
	Development of SW Development Plan (SDP)	2	3	4
	Use of SDP in proposal evaluation	2	3	4
	Work Break-down Structure (WBS) for SW	2	3	4
	Laws/regulation related to SOW and RFP	2	3	4
	Quality Issues	2	3	4
	Contract types and their strengths and weaknesses (for all types of systems)	2	3	4
	Deliverables (issues and tradeoffs)	2	3	4
	SW portion of Proposal Evaluation	2	3	4
	Data and intellectual property rights	2	3	4
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	2	3	4
	Model SOWs	2	3	4
Configuration Management				
	Standards for Configuration Mgt	2	3	4
	Configuration Mgt Planning	2	3	4
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	2	3	4
	Synchronization of HW and SW baselines	2	3	4
	Configuration Management CASE tools	2	3	4
	Management of Configuration Risks	2	3	4
Software Cost & Schedule Estimation				
	Strengths and weaknesses of methods and models used for SW cost & schedule estimation	1	3	4
	SW cost & schedule reporting	1	3	4
	Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	1	3	4
	Life Cycle Costs (incl PDSS)	1	3	4
Program/Project Office organization & relationships				
	Staffing	2	3	4
	Organization	2	3	4
	Matrix Support Groups	2	3	4
	Resource Management	2	3	4
	Project Control	2	3	4
	Project Tracking	2	3	4
	End User Involvement	2	3	4
	IPT's and working groups	2	3	4
	Intergroup Coordination	2	3	4
	Corrective Actions	2	3	4
	Lessons Learned	2	3	4
	Management Issues	2	3	4

Software developing and acquiring maturity				
	Roles of assessments/evaluations	2	3	4
	Methods available to assess maturity	2	3	4
	Strengths and weaknesses of current methods	2	3	4
	Applications of assessments and evaluations	2	3	4
	Role of evaluations/assessments in contracting	2	3	4
	Frequency of evaluations/assessments	2	3	4
	Responsibilities for evaluations/assessments	2	3	4
Engineering Approaches & Methodologies				
	Current approaches (e.g., Functional, Object-Oriented)	2	3	4
	Strengths and weaknesses of design approaches	2	3	4
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	2	3	4
	Software Design Guidance (laws, regs, Stds)	2	3	4
	Technical fundamentals	2	3	4
	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	2	3	4
	Criteria for Paradigm selection	2	3	4
	Risks and benefits of each development	2	3	4
	Paradigm selection resource/management issues	2	3	4
Technical Assessments				
	Business Process Reengineering (BPR)	0	1	2
	Adapting maturing technologies	0	1	2
	Development Information System/Enterprise	0	1	2
	FPI Guidance, Process, Tools	0	1	2
	Model Relationship	0	1	2
Interoperability				
	Interoperability and Data Administration Issues	1	3	3
	Interoperability and data administration guidance (Laws, regulation, and standards)	1	3	3
	Relationship of Software/System Architecture and interoperability	1	3	3
Independent Verification and Validation (IV&V)				
	IV&V definition, benefits, and disadvantages	1	2	2
	Determine IV&V levels	1	2	2
	IV&V guidance	1	2	2
	IV&V relationship to risk management and testing	1	2	2
	IV&V effect on development schedule	1	2	2
Life Cycle Management				
	Cost Factors identification	1	3	4
	Key Software support transition issues	1	3	4
	Organic/Outsourcing Post Deployment Software Support	1	3	4
	Software Engineering Environment acquisition & use	1	3	4
	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	1	3	4
	Support Organization Involvement	1	3	4
	Continuous process improvement	1	3	4
	End User Involvement	1	3	4
	Corrective Actions Management	1	3	4
	Contract Baseline	1	3	4
	Relationship with contractor	1	3	4
Metrics				
	Appropriate metrics for visibility into development process, software product, system progress	1	3	4
	Metrics Collection methodologies	1	3	4
	Metrics Interpretation	1	3	4
	Bench marking practices	1	3	4
Open Systems				
	Open System Migration issues	1	2	3
	Open System guidance (Application Portability Profile, regulations, standards)	1	2	3
	Open System adaptation effect on acquisition	1	2	3
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	1	2	3
Software Quality Management				
	Software quality factors	1	2	3
	Software quality guidance	1	2	3

	Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	1	2	3
	Benefits and risks associated with software quality methods	1	2	3
	Software Project Management visibility into software quality (metrics and inspections)	1	2	3
	Software Product Assessment Techniques	1	2	3
	Software Quality Assurance Planning and Techniques	1	2	3
Software Requirement Management				
	Software Requirement management definition	1	3	3
	Requirement Management guidance	1	3	3
	Requirement Management responsibilities	1	3	3
	User involvement	1	3	3
	Requirement Planning issues	1	3	3
	Types of requirements (derived, explicit, decomposed)	1	3	3
	Software requirement definition, benefits, and risks of prototyping	1	3	3
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	1	3	3
	Requirements/COTS issues	1	3	3
	Critical measures of effectiveness for operational issues and criteria	1	3	3
Software Reviews & Audits				
	Government management of reviews and audit process	1	3	3
	High interest Software issues and their indicators	1	3	3
	Critical Software life cycle reviews	1	3	3
	Key Software review questions and data	1	3	3
	Entrance & Exit Criteria	1	3	3
	Software review relationship to system reviews	1	3	3
Software Reuse				
	Software Architecture/reuse relationship	2	3	4
	Risk mitigation through reuse	2	3	4
	Reuse guidance	2	3	4
	Domain specific reuse paradigm	2	3	4
	Existing Reuse repositories	2	3	4
	Contracting mechanisms for reuse	2	3	4
	Impact of Open Systems on software reuse	2	3	4
	COTS/Reuse Issues	2	3	4
	Portability, through platform independence	2	3	4
Software Acquisition Risk Management				
	Software Risk Analysis	2	3	4
	Software Risk management issues (planning, etc.)	2	3	4
	Varying risk profile through life cycle	2	3	4
	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	2	3	4
	Risk Management guidance	2	3	4
	Domain Competent Work Force	2	3	4
Software Security				
	Software security definition	1	3	3
	Security Risk Management	1	3	3
	Software security guidance (regulations, standards, "orange book")	1	3	3
	System Certification	1	3	3
	Contemporary security developments	1	3	3
Software testing Issues				
	Software testing Phases (DT&E, F/OT&E)	2	3	4
	Appropriate Testing metrics (software maturity, error density)	2	3	4
	Type of Testing (unit, FOT, integration, DT/OT).	2	3	4
	Software integration testing issues	2	3	4
	Sufficient software testing	2	3	4
	Test and Evaluation Master Plan relationship to Testing	2	3	4
	High Integrity Systems	2	3	4
	Identification of Testing Risks	2	3	4
Emerging issues & Technologies				
	Joint Technical Architecture (JTA)	1	2	3
	Domain & product line engineering	1	2	3
	Software technology state of the art	1	2	3

B-3 SMRT T&E Engineering Competencies for Levels I, II, and III

Test & Evaluation SMRT Competencies				
Key Competency Area	**Sub-competencies**	**Level I**	**Level II**	**Level III**
		Generalists	Generalists	Generalists
Acquisition Strategies				
	Best system strategies for SW intensive systems	1	2	3
	Affect of current system Strategies on SW Acquisition Mgmt	1	2	3
	Strengths and weaknesses of current strategies	1	2	3
	Impact of acquisition strategy on SW project planning and SW Engineering methods	1	2	3
	Impact of Acquisition Reform	1	2	3
Architecture				
	Software Architecture Fundamentals	1	3	3
	Relationship of SW to System Architecture	1	3	3
	Relationship of Architecture to SW Design	1	3	3
	Impact of architecture on interoperability and reuse	1	3	3
	Differences in C3I, MCCR, and AIS systems	1	3	3
	Evaluating and Acquiring target environments	1	3	3
	Product line & domain engineering considerations (tradeoffs & analysis)	1	3	3
Contracting Issues				
	Development of SW Development Plan (SDP)	1	3	4
	Use of SDP in proposal evaluation	1	3	4
	Work Break-down Structure (WBS) for SW	1	3	4
	Laws/regulation related to SOW and RFP	1	3	4
	Quality Issues	1	3	4
	Contract types and their strengths and weaknesses (for all types of systems)	1	3	4
	Deliverables (issues and tradeoffs)	1	3	4
	SW portion of Proposal Evaluation	1	3	4
	Data and intellectual property rights	1	3	4
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	1	3	4
	Model SOWs	1	3	4
Configuration Management				
	Standards for Configuration Mgt	2	3	3
	Configuration Mgt Planning	2	3	3
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	2	3	3
	Synchronization of HW and SW baselines	2	3	3
	Configuration Management CASE tools	2	3	3
	Management of Configuration Risks	2	3	3
Software Cost & Schedule Estimation				
	Strengths and weaknesses of methods and models used for SW cost & schedule estimation	1	3	4
	SW cost & schedule reporting	1	3	4
	Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	1	3	4
	Life Cycle Costs (incl PDSS)	1	3	4
Program/Project Office organization & relationships				
	Staffing	2	3	3
	Organization	2	3	3
	Matrix Support Groups	2	3	3
	Resource Management	2	3	3
	Project Control	2	3	3
	Project Tracking	2	3	3
	End User Involvement	2	3	3
	IPT's and working groups	2	3	3
	Intergroup Coordination	2	3	3
	Corrective Actions	2	3	3
	Lessons Learned	2	3	3
	Management Issues	2	3	3
Software developing and				
	Roles of assessments/evaluations	1	2	3

acquiring maturity	Methods available to assess maturity	1	2	3
	Strengths and weaknesses of current methods	1	2	3
	Applications of assessments and evaluations	1	2	3
	Role of evaluations/assessments in contracting	1	2	3
	Frequency of evaluations/assessments	1	2	3
	Responsibilities for evaluations/assessments	1	2	3
Engineering Approaches & Methodologies				
	Current approaches (e.g., Functional, Object-Oriented)	2	3	3
	Strengths and weaknesses of design approaches	2	3	3
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	2	3	3
	Software Design Guidance (laws, regs, Stds)	2	3	3
	Technical fundamentals	2	3	3
	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	2	3	3
	Criteria for Paradigm selection	2	3	3
	Risks and benefits of each development	2	3	3
	Paradigm selection resource/management issues	2	3	3
Technical Assessments				
	Business Process Reengineering (BPR)	0	1	1
	Adapting maturing technologies	0	1	1
	Development Information System/Enterprise	0	1	1
	FPI Guidance, Process, Tools	0	1	1
	Model Relationship	0	1	1
Interoperability				
	Interoperability and Data Administration Issues	1	3	3
	Interoperability and data administration guidance (Laws, regulation, and standards)	1	3	3
	Relationship of Software/System Architecture and interoperability	1	3	3
Independent Verification and Validation (IV&V)				
	IV&V definition, benefits, and disadvantages	1	2	2
	Determine IV&V levels	1	2	2
	IV&V guidance	1	2	2
	IV&V relationship to risk management and testing	1	2	2
	IV&V effect on development schedule	1	2	2
Life Cycle Management				
	Cost Factors identification	1	3	4
	Key Software support transition issues	1	3	4
	Organic/Outsourcing Post Deployment Software Support	1	3	4
	Software Engineering Environment acquisition & use	1	3	4
	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	1	3	4
	Support Organization Involvement	1	3	4
	Continuous process improvement	1	3	4
	End User Involvement	1	3	4
	Corrective Actions Management	1	3	4
	Contract Baseline	1	3	4
	Relationship with contractor	1	3	4
Metrics				
	Appropriate metrics for visibility into development process, software product, system progress	1	3	4
	Metrics Collection methodologies	1	3	4
	Metrics Interpretation	1	3	4
	Bench marking practices	1	3	4
Open Systems				
	Open System Migration issues	1	2	3
	Open System guidance (Application Portability Profile, regulations, standards)	1	2	3
	Open System adaptation effect on acquisition	1	2	3
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	1	2	3
Software Quality Management				
	Software quality factors	1	2	3
	Software quality guidance	1	2	3
	Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	1	2	3

	Benefits and risks associated with software quality methods	1	2	3
	Software Project Management visibility into software quality (metrics and inspections)	1	2	3
	Software Product Assessment Techniques	1	2	3
	Software Quality Assurance Planning and Techniques	1	2	3
Software Requirement Management				
	Software Requirement management definition	1	2	3
	Requirement Management guidance	1	2	3
	Requirement Management responsibilities	1	2	3
	User involvement	1	2	3
	Requirement Planning issues	1	2	3
	Types of requirements (derived, explicit, decomposed)	1	2	3
	Software requirement definition, benefits, and risks of prototyping	1	2	3
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	1	2	3
	Requirements/COTS issues	1	2	3
	Critical measures of effectiveness for operational issues and criteria	1	2	3
Software Reviews & Audits				
	Government management of reviews and audit process	1	2	3
	High interest Software issues and their indicators	1	2	3
	Critical Software life cycle reviews	1	2	3
	Key Software review questions and data	1	2	3
	Entrance & Exit Criteria	1	2	3
	Software review relationship to system reviews	1	2	3
Software Reuse				
	Software Architecture/reuse relationship	1	3	3
	Risk mitigation through reuse	1	3	3
	Reuse guidance	1	3	3
	Domain specific reuse paradigm	1	3	3
	Existing Reuse repositories	1	3	3
	Contracting mechanisms for reuse	1	3	3
	Impact of Open Systems on software reuse	1	3	3
	COTS/Reuse Issues	1	3	3
	Portability, through platform independence	1	3	3
Software Acquisition Risk Management				
	Software Risk Analysis	1	3	3
	Software Risk management issues (planning, etc.)	1	3	3
	Varying risk profile through life cycle	1	3	3
	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	1	3	3
	Risk Management guidance	1	3	3
	Domain Competent Work Force	1	3	3
Software Security				
	Software security definition	1	3	3
	Security Risk Management	1	3	3
	Software security guidance (regulations, standards, "orange book")	1	3	3
	System Certification	1	3	3
	Contemporary security developments	1	3	3
Software testing Issues				
	Software testing Phases (DT&E, F/OT&E)	2	3	4
	Appropriate Testing metrics (software maturity, error density)	2	3	4
	Type of Testing (unit, FOT, integration, DT/OT).	2	3	4
	Software integration testing issues	2	3	4
	Sufficient software testing	2	3	4
	Test and Evaluation Master Plan relationship to Testing	2	3	4
	High Integrity Systems	2	3	4
	Identification of Testing Risks	2	3	4
Emerging issues & Technologies				
	Joint Technical Architecture (JTA)	1	2	2
	Domain & product line engineering	1	2	2
	Software technology state of the art	1	2	2

B-4 SMRT Acquisition Logistics Competencies for Levels I, II, and III

Logistics SMRT Competencies				
Key Competency Area	**Sub-competencies**	**Level I** Generalists	**Level II** Generalists	**Level III** Generalists
Acquisition Strategies				
	Best system strategies for SW intensive systems	1	2	2
	Affect of current system Strategies on SW Acquisition Mgmt	1	2	2
	Strengths and weaknesses of current strategies	1	2	2
	Impact of acquisition strategy on SW project planning and SW Engineering methods	1	2	2
	Impact of Acquisition Reform	1	2	2
Architecture				
	Software Architecture Fundamentals	0	2	2
	Relationship of SW to System Architecture	0	2	2
	Relationship of Architecture to SW Design	0	2	2
	Impact of architecture on interoperability and reuse	0	2	2
	Differences in C3I, MCCR, and AIS systems	0	2	2
	Evaluating and Acquiring target environments	0	2	2
	Product line & domain engineering considerations (tradeoffs & analysis)	0	2	2
Contracting Issues				
	Development of SW Development Plan (SDP)	1	2	3
	Use of SDP in proposal evaluation	1	2	3
	Work Break-down Structure (WBS) for SW	1	2	3
	Laws/regulation related to SOW and RFP	1	2	3
	Quality Issues	1	2	3
	Contract types and their strengths and weaknesses (for all types of systems)	1	2	3
	Deliverables (issues and tradeoffs)	1	2	3
	SW portion of Proposal Evaluation	1	2	3
	Data and intellectual property rights	1	2	3
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	1	2	3
	Model SOWs	1	2	3
Configuration Management				
	Standards for Configuration Mgt	1	2	3
	Configuration Mgt Planning	1	2	3
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	1	2	3
	Synchronization of HW and SW baselines	1	2	3
	Configuration Management CASE tools	1	2	3
	Management of Configuration Risks	1	2	3
Software Cost & Schedule Estimation				
	Strengths and weaknesses of methods and models used for SW cost & schedule estimation	1	2	3
	SW cost & schedule reporting	1	2	3
	Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	1	2	3
	Life Cycle Costs (incl PDSS)	1	2	3
Program/Project Office organization & relationships				
	Staffing	2	3	4
	Organization	2	3	4
	Matrix Support Groups	2	3	4
	Resource Management	2	3	4
	Project Control	2	3	4
	Project Tracking	2	3	4
	End User Involvement	2	3	4
	IPT's and working groups	2	3	4
	Intergroup Coordination	2	3	4
	Corrective Actions	2	3	4
	Lessons Learned	2	3	4
	Management Issues	2	3	4
Software developing and				
	Roles of assessments/evaluations	1	2	3

acquiring maturity	Methods available to assess maturity	1	2	3
	Strengths and weaknesses of current methods	1	2	3
	Applications of assessments and evaluations	1	2	3
	Role of evaluations/assessments in contracting	1	2	3
	Frequency of evaluations/assessments	1	2	3
	Responsibilities for evaluations/assessments	1	2	3
Engineering Approaches & Methodologies				
	Current approaches (e.g., Functional, Object-Oriented)	1	2	3
	Strengths and weaknesses of design approaches	1	2	3
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	1	2	3
	Software Design Guidance (laws, regs, Stds)	1	2	3
	Technical fundamentals	1	2	3
	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	1	2	3
	Criteria for Paradigm selection	1	2	3
	Risks and benefits of each development	1	2	3
	Paradigm selection resource/management issues	1	2	3
Technical Assessments				
	Business Process Reengineering (BPR)	0	1	2
	Adapting maturing technologies	0	1	2
	Development Information System/Enterprise	0	1	2
	FPI Guidance, Process, Tools	0	1	2
	Model Relationship	0	1	2
Interoperability				
	Interoperability and Data Administration Issues	1	3	3
	Interoperability and data administration guidance (Laws, regulation, and standards)	1	3	3
	Relationship of Software/System Architecture and interoperability	1	3	3
Independent Verification and Validation (IV&V)				
	IV&V definition, benefits, and disadvantages	0	0	2
	Determine IV&V levels	0	0	2
	IV&V guidance	0	0	2
	IV&V relationship to risk management and testing	0	0	2
	IV&V effect on development schedule	0	0	2
Life Cycle Management				
	Cost Factors identification	1	3	4
	Key Software support transition issues	1	3	4
	Organic/Outsourcing Post Deployment Software Support	1	3	4
	Software Engineering Environment acquisition & use	1	3	4
	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	1	3	4
	Support Organization Involvement	1	3	4
	Continuous process improvement	1	3	4
	End User Involvement	1	3	4
	Corrective Actions Management	1	3	4
	Contract Baseline	1	3	4
	Relationship with contractor	1	3	4
Metrics				
	Appropriate metrics for visibility into development process, software product, system progress	0	1	2
	Metrics Collection methodologies	0	1	2
	Metrics Interpretation	0	1	2
	Bench marking practices	0	1	2
Open Systems				
	Open System Migration issues	1	2	2
	Open System guidance (Application Portability Profile, regulations, standards)	1	2	2
	Open System adaptation effect on acquisition	1	2	2
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	1	2	2
Software Quality Management				
	Software quality factors	1	2	2
	Software quality guidance	1	2	2
	Quality improvement methods (Formal Inspection, Walk	1	2	2

	throughs, Clean room, Peer reviews)			
	Benefits and risks associated with software quality methods	1	2	2
	Software Project Management visibility into software quality (metrics and inspections)	1	2	2
	Software Product Assessment Techniques	1	2	2
	Software Quality Assurance Planning and Techniques	1	2	2
Software Requirement Management				
	Software Requirement management definition	1	2	2
	Requirement Management guidance	1	2	2
	Requirement Management responsibilities	1	2	2
	User involvement	1	2	2
	Requirement Planning issues	1	2	2
	Types of requirements (derived, explicit, decomposed)	1	2	2
	Software requirement definition, benefits, and risks of prototyping	1	2	2
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	1	2	2
	Requirements/COTS issues	1	2	2
	Critical measures of effectiveness for operational issues and criteria	1	2	2
Software Reviews & Audits				
	Government management of reviews and audit process	1	2	2
	High interest Software issues and their indicators	1	2	2
	Critical Software life cycle reviews	1	2	2
	Key Software review questions and data	1	2	2
	Entrance & Exit Criteria	1	2	2
	Software review relationship to system reviews	1	2	2
Software Reuse				
	Software Architecture/reuse relationship	1	3	3
	Risk mitigation through reuse	1	3	3
	Reuse guidance	1	3	3
	Domain specific reuse paradigm	1	3	3
	Existing Reuse repositories	1	3	3
	Contracting mechanisms for reuse	1	3	3
	Impact of Open Systems on software reuse	1	3	3
	COTS/Reuse Issues	1	3	3
	Portability, through platform independence	1	3	3
Software Acquisition Risk Management				
	Software Risk Analysis	0	2	3
	Software Risk management issues (planning, etc.)	0	2	3
	Varying risk profile through life cycle	0	2	3
	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	0	2	3
	Risk Management guidance	0	2	3
	Domain Competent Work Force	0	2	3
Software Security				
	Software security definition	0	2	2
	Security Risk Management	0	2	2
	Software security guidance (regulations, standards, "orange book")	0	2	2
	System Certification	0	2	2
	Contemporary security developments	0	2	2
Software testing Issues				
	Software testing Phases (DT&E, F/OT&E)	0	2	2
	Appropriate Testing metrics (software maturity, error density)	0	2	2
	Type of Testing (unit, FOT, integration, DT/OT).	0	2	2
	Software integration testing issues	0	2	2
	Sufficient software testing	0	2	2
	Test and Evaluation Master Plan relationship to Testing	0	2	2
	High Integrity Systems	0	2	2
	Identification of Testing Risks	0	2	2
Emerging issues & Technologies				
	Joint Technical Architecture (JTA)	1	2	2
	Domain & product line engineering	1	2	2
	Software technology state of the art	1	2	2

B-5 SMRT Contracting Competencies for Levels I, II, and III

Contracts SMRT Competencies				
Key Competency Area	**Sub-competencies**	**Level I**	**Level II**	**Level III**
		Generalists	Generalists	Generalists
Acquisition Strategies				
	Best system strategies for SW intensive systems	1	2	2
	Affect of current system Strategies on SW Acquisition Mgmt	1	2	2
	Strengths and weaknesses of current strategies	1	2	2
	Impact of acquisition strategy on SW project planning and SW Engineering methods	1	2	2
	Impact of Acquisition Reform	1	2	2
Architecture				
	Software Architecture Fundamentals	0	1	2
	Relationship of SW to System Architecture	0	1	2
	Relationship of Architecture to SW Design	0	1	2
	Impact of architecture on interoperability and reuse	0	1	2
	Differences in C3I, MCCR, and AIS systems	0	1	2
	Evaluating and Acquiring target environments	0	1	2
	Product line & domain engineering considerations (tradeoffs & analysis)	0	1	2
Contracting Issues				
	Development of SW Development Plan (SDP)	2	4	4
	Use of SDP in proposal evaluation	2	4	4
	Work Break-down Structure (WBS) for SW	2	4	4
	Laws/regulation related to SOW and RFP	2	4	4
	Quality Issues	2	4	4
	Contract types and their strengths and weaknesses (for all types of systems)	2	4	4
	Deliverables (issues and tradeoffs)	2	4	4
	SW portion of Proposal Evaluation	2	4	4
	Data and intellectual property rights	2	4	4
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	2	4	4
	Model SOWs	2	4	4
Configuration Management				
	Standards for Configuration Mgt	0	1	2
	Configuration Mgt Planning	0	1	2
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	0	1	2
	Synchronization of HW and SW baselines	0	1	2
	Configuration Management CASE tools	0	1	2
	Management of Configuration Risks	0	1	2
Software Cost & Schedule Estimation				
	Strengths and weaknesses of methods and models used for SW cost & schedule estimation	1	2	2
	SW cost & schedule reporting	1	2	2
	Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	1	2	2
	Life Cycle Costs (incl PDSS)			
Program/Project Office organization & relationships				
	Staffing	0	1	2
	Organization	0	1	2
	Matrix Support Groups	0	1	2
	Resource Management	0	1	2
	Project Control	0	1	2
	Project Tracking	0	1	2
	End User Involvement	0	1	2
	IPT's and working groups	0	1	2
	Intergroup Coordination	0	1	2
	Corrective Actions	0	1	2
	Lessons Learned	0	1	2
	Management Issues	0	1	2
Software		0	1	2

developing and acquiring maturity	Roles of assessments/evaluations	0	1	2
	Methods available to assess maturity	0	1	2
	Strengths and weaknesses of current methods	0	1	2
	Applications of assessments and evaluations	0	1	2
	Role of evaluations/assessments in contracting	0	1	2
	Frequency of evaluations/assessments	0	1	2
	Responsibilities for evaluations/assessments	0	1	2
Engineering Approaches & Methodologies				
	Current approaches (e.g., Functional, Object-Oriented)	1	2	2
	Strengths and weaknesses of design approaches	1	2	2
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	1	2	2
	Software Design Guidance (laws, regs, Stds)	1	2	2
	Technical fundamentals	1	2	2
	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	1	2	2
	Criteria for Paradigm selection	1	2	2
	Risks and benefits of each development	1	2	2
	Paradigm selection resource/management issues	1	2	2
Technical Assessments				
	Business Process Reengineering (BPR)	0	1	1
	Adapting maturing technologies	0	1	1
	Development Information System/Enterprise	0	1	1
	FPI Guidance, Process, Tools	0	1	1
	Model Relationship	0	1	1
Interoperability		0	1	1
	Interoperability and Data Administration Issues	0	1	1
	Interoperability and data administration guidance (Laws, regulation, and standards)	0	1	1
	Relationship of Software/System Architecture and interoperability	0	1	1
Independent Verification and Validation (IV&V)				
	IV&V definition, benefits, and disadvantages	1	2	2
	Determine IV&V levels	1	2	2
	IV&V guidance	1	2	2
	IV&V relationship to risk management and testing	1	2	2
	IV&V effect on development schedule	1	2	2
Life Cycle Management				
	Cost Factors identification	0	1	2
	Key Software support transition issues	0	1	2
	Organic/Outsourcing Post Deployment Software Support	0	1	2
	Software Engineering Environment acquisition & use	0	1	2
	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	0	1	2
	Support Organization Involvement	0	1	2
	Continuous process improvement	0	1	2
	End User Involvement	0	1	2
	Corrective Actions Management	0	1	2
	Contract Baseline	0	1	2
	Relationship with contractor	0	1	2
Metrics				
	Appropriate metrics for visibility into development process, software product, system progress	0	1	2
	Metrics Collection methodologies	0	1	2
	Metrics Interpretation	0	1	2
	Bench marking practices	0	1	2
Open Systems				
	Open System Migration issues	1	2	2
	Open System guidance (Application Portability Profile, regulations, standards)	1	2	2
	Open System adaptation effect on acquisition	1	2	2
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	1	2	2
Software Quality Management				
	Software quality factors	1	2	2
	Software quality guidance	1	2	2

	Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	1	2	2
	Benefits and risks associated with software quality methods	1	2	2
	Software Project Management visibility into software quality (metrics and inspections)	1	2	2
	Software Product Assessment Techniques	1	2	2
	Software Quality Assurance Planning and Techniques	1	2	2
Software Requirement Management				
	Software Requirement management definition	1	2	2
	Requirement Management guidance	1	2	2
	Requirement Management responsibilities	1	2	2
	User involvement	1	2	2
	Requirement Planning issues	1	2	2
	Types of requirements (derived, explicit, decomposed)	1	2	2
	Software requirement definition, benefits, and risks of prototyping	1	2	2
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	1	2	2
	Requirements/COTS issues	1	2	2
	Critical measures of effectiveness for operational issues and criteria	1	2	2
Software Reviews & Audits				
	Government management of reviews and audit process	1	2	2
	High interest Software issues and their indicators	1	2	2
	Critical Software life cycle reviews	1	2	2
	Key Software review questions and data	1	2	2
	Entrance & Exit Criteria	1	2	2
	Software review relationship to system reviews	1	2	2
Software Reuse				
	Software Architecture/reuse relationship	1	2	3
	Risk mitigation through reuse	1	2	3
	Reuse guidance	1	2	3
	Domain specific reuse paradigm	1	2	3
	Existing Reuse repositories	1	2	3
	Contracting mechanisms for reuse	1	2	3
	Impact of Open Systems on software reuse	1	2	3
	COTS/Reuse Issues	1	2	3
	Portability, through platform independence	1	2	3
Software Acquisition Risk Management				
	Software Risk Analysis	0	2	2
	Software Risk management issues (planning, etc.)	0	2	2
	Varying risk profile through life cycle	0	2	2
	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	0	2	2
	Risk Management guidance	0	2	2
	Domain Competent Work Force	0	2	2
Software Security				
	Software security definition	0	2	2
	Security Risk Management	0	2	2
	Software security guidance (regulations, standards, "orange book")	0	2	2
	System Certification	0	2	2
	Contemporary security developments	0	2	2
Software testing Issues				
	Software testing Phases (DT&E, F/OT&E)	0	0	0
	Appropriate Testing metrics (software maturity, error density)	0	0	0
	Type of Testing (unit, FOT, integration, DT/OT).	0	0	0
	Software integration testing issues	0	0	0
	Sufficient software testing	0	0	0
	Test and Evaluation Master Plan relationship to Testing	0	0	0
	High Integrity Systems	0	0	0
	Identification of Testing Risks	0	0	0
Emerging issues & Technologies				
	Joint Technical Architecture (JTA)	1	2	2
	Domain & product line engineering	1	2	2
	Software technology state of the art	1	2	2

B-6 Legal Competencies

Defining Rights In Intellectual Property Under Government Procurement Contracts

- Principles of Patent law
- Define Types of Patents
- Discuss Bayh-Dole Act and Implementing Executive Orders
- Review Principles of Copyright Law
- Discuss Exclusive Rights vs. Limitation on Rights
- Discuss Copyrights under Government Contracts
- Principles of Trademark Law
- Consideration arising from E-Commerce

Rights in Technical Data and Computer Software in Government Contracts

- Definitions of technical data and computer software
- Explain Regulatory Revisions and Frameworks
- Explain Unlimited Rights
- Define Limited Rights in Technical Data
- Define Government Purpose License rights and Government Purpose Rights
- Define non-standard rights

Software Escrow

- Define different types of software agreements
- Software Escrow benefits and concerns for the Government
- Software Escrow benefits and concerns for the Developer
- Software Escrow benefits and concerns for the Prime Contractor
- Discuss common pitfalls for of SW escrow agreements

Intellectual Property Rights under CRADA's

- Define CRADA's
- Discuss CRADA marketing considerations

Enforcing Intellectual Property Rights Under Government Contracts

- Claims against the Government for Infringement of Misappropriations
- Discuss March-In Rights

Emerging Intellectual Property Issues

- Relating to Home Land Security
- Relating to Open Source Software

Licensing Software and Technology to the Federal Government

- Discuss Issues Regarding Government Buys of Intellectual Property
- Discuss Issues Regarding Government Licenses of Intellectual Property
- Discuss Writing Standard License Agreements
- Review Government Purpose & Nonstandard Rights 1988 and 1995 Regulations
- Discuss SW rights resulting from Experimental Development
- Discuss "Government Purpose Rights"
- Discuss Remedies in Bid Protest Cases
- Discuss Remedies for Licensing Problems
- Discuss the breach of contract damages
- Define limited rights in technical data
- Define restricted rights in computer software
- Discuss warranties and indemnifications

Appendix C: DAWIA Core Certification Standards for Levels I, II, and III

C-1 Program Management

Level I Core Certification Standards	
Acquisition Training	• **ACQ 101**: *Fundamentals of Systems Acquisition Management*
Functional Training	• **SYS 101:** *Fundamentals of Systems Planning, Research Development and Engineering* (Required for certification on 4/1/08) • **CLB 007:** *Cost Analysis* (Required for certification on 4/1/08) • **CLB 016:** *Introduction To Earned Value Management* (Required for certification on 4/1/08)
Education	Formal education not required for certification.
Experience	• 1 year acquisition experience for Level I certification
Level II Core Certification Standards	
Acquisition Training	• **ACQ 201A:** *Intermediate Systems Acquisition Management* • **ACQ 201B:** *Intermediate Systems Acquisition Management* **CR**
Functional Training	• **PMT 250***: Program Management Tools Course* • **CON 110:** *Mission Planning Support* (Required for certification on 4/1/08) • **SAM 101:** *Basic Software Acquisition Management* (Required for certification on 4/1/08)
Education	Formal education not required for certification.
Experience	• 2 years acquisition experience required for Level II Certification; at least 1 year of this experience must be in program management
Level III Core Certification Standards	
Acquisition Training [2]	None Required
Functional Training	• **PMT 352A:** Program Management Office Course • **PMT 352B:** Program Management Office Course **CR** • **SYS 202:** Intermediate System Planning, Research, Development, & Engineering (Required for certification on 4/1/08)
Education	Formal education not required for certification.

Experience	• 4 years acquisition experience with at least:
	  • 2 years in a program office or similar organization (dedicated matrix support to a PM, PEO, DCMA Program Integrator, or Supervisors of Shipbuilding)
	  • 1 year in a program management position with cost, schedule, and performance responsibilities

C-2 SPRDE Systems and Software Engineering

Level I Core Certification Standards	
Acquisition Training	**ACQ 101:** *Fundamentals of Systems Acquisition Management [BU5] (DL)*
Functional Training	**SYS 101:** *Fundamentals of Systems Planning, Research, Development & Engineering [J01] (DL)*
Education	Baccalaureate or graduate degree in a technical or scientific field such as engineering, physics, chemistry, biology, mathematics, operations research, engineering management, or computer science.
Experience	1 year of technical experience in an acquisition position to include government or industry equivalent from among the following career fields/paths: SPRDE-Systems Engineering; SPRDE-Science and Technology Manager; Information Technology; Test and Evaluation; Production, Quality and Manufacturing; Facilities Engineering; Program Management; or Life Cycle Logistics.
Level II Core Certification Standards	
Education	• Baccalaureate or graduate degree in a technical or scientific field such as engineering, physics, chemistry, biology, mathematics, operations research, engineering management, or computer science.
Acquisition Training	• **ACQ 201A:** *Intermediate Systems Acquisition, Part A [JHJ] (DL)* • **ACQ 201B:** *Intermediate Systems Acquisition, Part B [JHK] (CR)*
Functional Training	• **SYS 202:** *Intermediate SPRDE, Part I [JO5] (DL)* • **SYS 203:** *Intermediate SPRDE, Part II [JO6] (CR)* • **CLE 003:** *Technical Reviews*
Experience	• 2 years of technical experience in an acquisition position to include government or industry equivalent from among the following career fields/paths: SPRDE-Systems Engineering; SPRDE-Science and Technology Manager; Information Technology; Test and Evaluation; Production, Quality and Manufacturing; Facilities Engineering; Program Management; or Life Cycle Logistics
Level III Core Certification Standards	
Education	Baccalaureate or graduate degree in a technical or scientific field such as engineering, physics, chemistry, biology, mathematics, operations research, engineering management, or computer science.
Acquisition Training	No requirements
Functional Training	• **SYS 302:** *Technical Leadership in Systems Engineering [JO7] (DL)* • **CLL 008:** *Designing for Supportability in DoD Systems*
Experience	4 years of technical experience in an acquisition position to include government or industry equivalent from among the following career fields/paths: SPRDE-Systems Engineering; SPRDE-Science and Technology Manager; Information Technology; Test and Evaluation; Production, Quality and Manufacturing; Facilities Engineering; Program Management; or Life Cycle Logistics

C-3 T&E Engineering

Level I Core Certification Standards	
Acquisition Training	• **ACQ 101:** *Fundamentals of Systems Acquisition Management*
Functional Training	• **SYS 101:** *Fundamentals of Systems Engineering* • **TST 102:** *Fundamentals of Test and Evaluation* • **CLE 023:** *Modeling & Simulation for Test and Evaluation (Completion of CLE 011 - M&S for SE- prior to October 1, 2007 satisfies this requirement)*
Education	• Baccalaureate degree or higher, including 24 semester hours or equivalent in technical or scientific courses such as mathematics (e.g., calculus, probability, statistics), physical sciences (e.g., chemistry, biology, physics), psychology, operations research/systems analysis, engineering, computer sciences, and information technology.
Experience	• 1 year of acquisition experience.
Level II Core Certification Standards	
Acquisition Training	• **ACQ 201A:** *Intermediate Systems Acquisition, Part A* • **ACQ 201B:** *Intermediate Systems Acquisition, Part B* **CR**
Functional Training	• **SYS 202:** *Intermediate SPRDE, Part I* • **TST 203:** *Intermediate Test and Evaluation* **CR** • **CLM 029:** *Net-Ready Key Performance Parameter*
Education	• Baccalaureate degree or higher, including 24 semester hours or equivalent in technical or scientific courses such as mathematics (e.g., calculus, probability, statistics), physical sciences (e.g., chemistry, biology, physics), psychology, operations research/systems analysis, engineering, computer sciences, and information technology.
Experience	• 2 years of Test & Evaluation experience.
Level III Core Certification Standards	
Acquisition Training	• No requirements.
Functional Training	• **TST 302:** *Advanced Test and Evaluation* **CR** • **CLM 029:** *Net-Ready Key Performance Parameter*
Education	• Baccalaureate degree or higher, including 24 semester hours or equivalent in technical or scientific courses such as mathematics (e.g., calculus, probability, statistics), physical sciences (e.g., chemistry, biology, physics), psychology, operations research/systems analysis, engineering, computer sciences, and information technology.
Experience	• 4 years of Test & Evaluation experience.

C-4 Acquisition Logistics

Level I Core Certification Standards	
Acquisition Training	• **ACQ 101**: *Fundamentals of Systems Acquisition Management*
Functional Training	• **LOG 101**: *Acquisition Logistics Fundamentals* • **LOG 102**: *Systems Sustainment Management Fundamentals* • **CLL 008**: *Designing for Supportability in DoD Systems* • **CLL 011**: *Performance Based Logistics (PBL)*
Education	• Formal education not required for certification
Experience	• 1 year of acquisition and/or sustainment experience in life cycle logistics
Level II Core Certification Standards	
Acquisition Training	• **ACQ 201**: *Intermediate Systems Acquisition, Part A* • **ACQ 201**: *Intermediate Systems Acquisition, Part B* **CR**
Functional Training	• **LOG 200**: *Intermediate Acquisition Logistics, Part A* • **LOG 201**: *Intermediate Acquisition Logistics, Part B* **CR** • **LOG 235**: *Performance Based Logistics, Part A* • **LOG 236**: *Performance Based Logistics, Part B* **CR** • Two additional supervisor-employee agreed upon courses or continuous learning (CL) modules from Core Plus list below
Education	• Formal education not required for certification
Experience	• 2 years of acquisition and/or sustainment experience in life cycle logistics
Level III Core Certification Standards	
Acquisition Training	• No additional requirements
Functional Training	• **LOG 304**: *Advanced Life Cycle Logistics Management* **CR** • Two additional supervisor-employee agreed upon courses or continuous learning (CL) modules from Core Plus list below
Education	• Formal education not required for certification.
Experience	• 4 years of acquisition and/or sustainment experience in life cycle logistics

C-5 Contracting

Level I Core Certification Standards	
Acquisition Training	None Required
Functional Training	• **CON 100:** *Shaping Smart Business Decisions* **CR** • **CON 110:** *Mission Support Planning* • **CON 111:** *Mission Planning Execution* • **CON 112:** *Mission Performance Assessment* • **CON 120:** *Mission Focused Contracting* **CR** • **CLC 033:** *Contract Format and Structure for DoD e-business Environment* (vice prior elective)
Education	• Baccalaureate degree and • At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management.
Experience	• 1 year of contracting experience.
Level II Core Certification Standards	
Acquisition Training	• **ACQ 101** *Fundamentals of Systems Acquisition (vice 2 electives)*
Functional Training	• **CON 214:** *Business Decisions for Contracting* • **CON 215:** *Intermediate Contracting for Mission Support* **CR** • **CON 216:** *Legal Considerations in Contracting* • **CON 217:** *Cost Analysis and Negotiation Technique* • **CON 218:** *Advanced Contracting for Mission Support* **CR**
Education	• Baccalaureate degree and • At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management.
Experience	• 2 years of contracting experience.
Level III Core Certification Standards	
Acquisition Training	• **ACQ 201A:** *Intermediate Systems Acquisition, Part A (in lieu of 2 unspecified electives)*
Functional Training	• **CON 353:** *Advanced Business Solutions for Mission Support* **CR** • 1 additional course from the Harvard Business Management Modules or the Contracting Matrix (in lieu of 2 unspecified electives)
Education	• Baccalaureate degree and • At least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management.
Experience	• 4 years of contracting experience.

Appendix D: Additional Software Relevant Courses Identified

D-1 Program Management

Level I	Level II	Level III
• DAU/**SAM 101**: Basic SW Acquisition Mgmt *OR* **IRM 101**: Basic Information • AFIT/**SYS 130**: CMMI OR NAVAIR CMMI • DAU/**CLE 012**: Naval Open Architectures	• DAU/**SAM 201**: Intermediate SW Acquisition Mgmt • AFIT/**CSE 481**: Intro to SW Engineering • AFIT/**CSE 479**: SW Project Initiating and Planning • DAU/**BCF 208**: SW Cost Estimating • CLE 015: Continuous Process Improvement	• DAU/**SAM 301**: Advanced SW Acquisition Mgmt •

D-2 SPRDE Systems & Software Engineering

Level I	Level II	Level III
• DAU/**SAM 101**: Basic SW Acquisition Mgmt *OR* **IRM 101**: Basic Information Systems Acquisition • AFIT/**CSE 481**: Intro to SW Engineering • AFIT/**SYS 130**: CMMI OR NAVAIR CMMI • DAU/**CLM 022**: Intro to Interoperability • DAU/**CLE 012**: Naval Open Architectures	• DAU/**SAM 201**: Intermediate SW Acq Mgmt • DAU/**BCF 208**: SW Cost Estimating • **SEI**: Intro to CMMI (3 day course) • AFIT/**SYS 165**: Intro to Risk Management • **CLE 020**: Enterprise Architecture • **CLM 029**: Net-Ready Key Performance Parameter •	• DAU/**SAM 301**: Advanced SW Acquisition Mgmt • DAU/**IRM 201***:* Intermediate Information systems Acquisition

D-3 T&E Engineering

Level I	Level II	Level III
• DAU/**SAM 101**: Basic SW Acquisition Mgmt *OR* **IRM 101**: Basic Information Systems Acquisition • DAU/**CLM 022**: Introduction to Interoperability • AFIT/**SYS 130**: CMMI OR NAVAIR CMMI • DAU/**CLE 012**: Naval Open Architectures	• DAU/**SAM 201**: Intermediate SW Acquisition Mgmt • AFIT/**CSE 481**: Intro to SW Engineering • DAU/**CLE 015**: Continuous Process Improvement (CPI) Familiarization	• DAU/**SAM 301**: Advanced SW Acquisition Mgmt • TBD/Advanced DODAF Implementation • SEI: Introduction to CMMI (3 day course)

D-4 Acquisition Logistics

Level I	Level II	Level III
• AFIT/**SYS 130**: CMMI OR NAVAIR CMMI • DAU/**SYS 101:** Fundamentals of SPRDE • DAU/**TST 101:** Introduction to Acq Workforce Test & Evaluation • DAU/**CLE 012**: Naval Open Architectures	• DAU/**BCF 208**: SW Cost Estimating • AFIT/**CSE 481**: Intro to SW Engineering • DAU/**SAM 101**: Basic SW Acquisition Mgmt OR IRM 101: Basic Information Systems Acquisition • **LOG 203**: Reliability & Maintainability • **LOG 204**: Configuration Management • **SYS 202**: Intermediate SPRDE, Part I • **CLE 015**: Continuous Process Improvement (CPI) Familiarization	• DAU/**SAM 201**: Intermediate SW Acquisition Mgmt • DAU/**SYS 203**: Intermediate SPRDE, Part II • DAU/**TST 301**: Advanced Test & Evaluation

D-5 Contracting

Level I	Level II	Level III
• DAU/**CLE 012**: Naval Open Architectures	• **SAM 101**: Basic SW Acquisition Mgmt *OR* **IRM 101**: Basic Information Systems Acquisition • AFIT/**SYS 130**: CMMI OR NAVAIR CMMI	• DAU/**SAM 201**: Intermediate SW Acquisition Mgmt

D-6 Legal

- FEDPUBSEMINARS Government Contract and Intellectual Property
- FEDPUBSEMINARS Licensing Software and Technology to the Federal Government
- FEDPUBSEMINARS Rights in Technical Data & Computer Software in Government Contracts

Appendix E: Gap Analyses

E-1 Program Management Gap Analyses

E-1.1 Level I Program Management Gap Analysis

• N – The course did not apply to competency. • P - The competency has been partially satisfied by the identified training course. • F – The competency has been satisfied by the identified training course.	**ACQ 101**: Fundamentals of Systems Acquisition	**SYS 101:** Fundamentals of SPRDE	**CLB 007:** Cost Analysis	**CLB 016:** Introduction to EVM	**SAM 101**: Basic SW Acquisition Mgmt	AFIT/ **SYS 130**: CMMI
	Level I					
	DAWIA				**Additional**	
Software Acquisition Management Regulatory/Technical Framework Application & Analysis						
Give examples of best system strategies for SW intensive systems	N	N	N	N	F	N
Explain the effect of current system Strategies on SW Acquisition Mgmt	N	N	N	N	F	N
Summarize the strengths and weaknesses of current strategies	N	N	N	N	F	N
Explain the impact of acquisition strategy on SW project planning and SW Engineering methods	N	N	N	N	F	N
Explain the impact of Acquisition Reform	F	N	N	N	F	N
Describe the functions of a DoD acquisition strategy and the elements included in a software acquisition.	N	N	N	N	F	N
Describe components of a [Software Acquisition] strategic plan.	N	N	N	N	F	N
Identify the contents of a [Software Acquisition] plan and explain where the information can be obtained.	N	N	N	N	F	N
Identify higher guidance and [Software Acquisition] goals for strategic planning.	N	N	N	N	F	N
Knowledge of laws, policies, regulations, directives, and guidance impacting DoD [Software Acquisition], including DoD and service specific [Software Acquisition].	N	N	N	N	F	N
Identify the major DoD acquisition policies that apply specifically to software acquisition management and software engineering.	N	N	N	N	F	N
Describe the integrated architecture framework; the relationships and roles of the DoD operational, systems, and technical architectures; and the impact of these architectures on the [Software] acquisition process.	N	N	N	N	F	N
Recognize software and system architectures.	N	N	N	N	F	N
Describe the fundamentals of the DoD Architecture Framework (DoDAF) and address the development, use, governance, and maintenance of architecture data.	N	P	N	N	F	N
Describe the program manager's role is managing architecture products and documentation.	N	P	N	N	F	N
Identify and describe basic principles of technical standards as they relate to system development and interoperability.	N	N	N	N	F	N
Identify interoperability terminology, the importance of planning for interoperability in a [Software] acquisition strategy, and the conceptual components of a [Software] system architecture; and demonstrate the relationship to interoperability.	N	N	N	N	F	N
Describe the software Architecture/reuse relationship	N	F	N	N	N	N
Describe risk mitigation through reuse	N	F	N	N	N	N
Identify reuse guidance	N	F	N	N	N	N
Describe domain specific reuse paradigm	N	F	N	N	N	N
Identify existing Reuse repositories	N	F	N	N	N	N

Describe contracting mechanisms for reuse	N	F	N	N	N	N
Describe the impact of Open Systems on software reuse	N	F	N	N	N	N
State COTS/Reuse Issues	N	F	N	N	N	N
Describe portability, through platform independence	N	F	N	N	N	N
Software Risk Management Application & Analysis						
Explain software Risk Analysis	N	P	N	N	F	N
Give examples of software Risk management issues (planning, etc.)	N	P	N	N	F	N
Explain varying risk profile through life cycle	N	F	N	N	N	N
Give examples of organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	N	F	N	N	N	N
Give examples of risk Management guidance	N	N	N	N	F	N
Summarize the concept of a Domain Competent Work Force	N	N	N	N	F	N
List and explain the steps of a risk management process for a [Software] acquisition.	N	N	N	N	F	N
Explain the purpose and at least one method for analyzing alternatives.	N	N	N	N	F	N
Identify software engineering risks.	N	N	N	N	F	N
Identify software risk management methodologies.	N	N	N	N	F	N
Describe techniques for attaining safe, secure, and reliable systems.	N	F	N	N	N	N
Explain how to incorporate risk management strategies into software project planning and management.	N	P	N	N	F	N
Compare and contrast the commonly accepted standards, tools, and methods used in risk management.	N	F	N	N	N	N
Explain how to monitor the status of software engineering risks and common SW risk management issues.	N	P	N	N	F	N
Define Software Security	N	P	N	N	N	N
Describe Security Risk Management	N	F	N	N	N	N
Identify Software security guidance (regulations, standards, "orange book")	N	P	N	N	F	N
Describe System Certification	N	P	N	N	N	N
List contemporary security developments	N	P	N	N	N	N
Describe the discipline of Software Safety	N	P	N	N	F	N
Government and Industry Software Acquisition Management roles						
Give examples of standards for Configuration Mgt	N	F	N	N	N	N
Summarize Configuration Mgt Planning	P	F	N	N	P	N
Explain the use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	P	P	N	N	F	N
Explain the synchronization of HW and SW baselines	N	F	N	N	N	N
Explain Configuration Management CASE tools	N	F	N	N	N	N
Explain the management of Configuration Risks	N	F	N	N	N	N
Explain the purpose for configuration management (CM) and at least four CM functions.	N	N	N	N	F	N
Explain the purpose for tracing and managing the configuration of requirements.	N	N	N	N	F	N
Summarize Staffing best practices.	N	N	N	N	F	N
Summarize Organizational best practices	N	N	N	N	F	N
Summarize best practices for Matrix Support Groups	P	N	N	N	F	N
Summarize Resource Management best practices	F	N	N	N	N	N
Summarize best practices for Project Control	P	N	N	N	F	N
Summarize best practices for Project Tracking	P	N	N	N	F	N
Explain End User Involvement	N	F	N	N	N	N
Summarize best practices for IPT's and working groups	P	P	N	N	F	N
Summarize best practices for Intergroup Coordination	P	P	N	N	F	N
Give examples of Corrective Actions	N	P	N	N	F	N
Give examples of Lessons Learned	P	N	N	N	F	N
Summarize best practices to deal with Management Issues	P	N	N	N	F	N
Explain the use of teams in managing [Software] acquisition programs and the concepts of team building.	N	P	N	N	F	N
Describe [Software] systems and methods for facilitating all aspects of program management.	P	N	N	N	F	N

Define organizational and individual roles and responsibilities involved in DoD software acquisition.	N	N	N	N	F	N
Reference sources for software acquisition and information technology management policies, standards, and best practices.	N	N	N	N	F	N
Reference sources for software acquisition and information technology management policies, standards, and best practices.	N	N	N	N	F	N
Describe the impact, roles and opportunities of the DoD Science & Technology Process (e.g. Advanced concept Technology Demonstrations (ACTD) and Advanced Technology Demonstration (ATD).	F	N	N	N	N	N
Unique Software Procurement Requirements Application & Analysis						
Explain the development of SW Development Plan (SDP)	N	N	N	N	F	N
Explain the use of SDP in proposal evaluation	N	N	N	N	F	N
Explain the Work Break-down Structure (WBS) for SW	F	N	N	N	N	N
Give examples of Laws/regulation related to SOW and RFP	N	N	N	N	F	N
Give examples of Quality Issues	N	N	N	N	F	N
Explain Contract types and their strengths and weaknesses (for all types of systems)	F	N	N	N	P	N
Give examples of Deliverables (issues and tradeoffs)	N	N	N	N	F	N
Explain the SW portion of Proposal Evaluation	N	N	N	N	F	N
Summarize data and intellectual property rights	N	P	N	N	P	N
Give examples of Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	N	F	N	N	P	N
Distinguish Model SOWs	P	N	N	N	F	N
Reference sources of DoD policy and guidance on the procurement of intellectual property, including software.	N	P	N	N	P	N
Identify the role and elements of electronic commerce in [Software Acquisitions].	N	N	N	N	F	N
Define commercial items and non-developmental items, and explain the commercial items acquisition process.	N	N	N	N	F	N
Describe solicitation methods, format, and content and explain the roles of the communications-computer acquisition professional in the solicitation process.	N	N	N	N	F	N
Identify the contents of a statement of work/statement of objectives and list sources that would help in their development.	N	N	N	N	F	N
Explain the role of evaluation criteria in a [Software Acquisition].	N	N	N	N	F	N
Describe a [Software Acquisition] source selection process.	N	N	N	N	F	N
Define contract administration and identify the contract administration responsibilities of various Government officials and organizations for a [Software Acquisition].	N	N	N	N	F	N
Identify the policies, procedures, and management techniques used to establish contract support capabilities for software-intensive systems.	N	N	N	N	F	N
Describe appropriate activities to ensure data rights and intellectual property policies are implemented successfully.	N	N	N	N	N	N
Describe Open System Migration issues	N	F	N	N	N	N
Identify Open System guidance (Application Portability Profile, regulations, standards)	N	F	N	N	N	N
Describe Open System adaptation effect on acquisition	N	F	N	N	N	N
Identify Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	N	F	N	N	N	N
Software Metrics Application & Analysis						
Describe the Roles of assessments/evaluations	N	N	N	N	P	F
Identify methods available to assess maturity	N	N	N	N	N	F
Describe the strengths and weaknesses of current methods	N	N	N	N	P	F
Describe the applications of assessments and evaluations	N	N	N	N	N	F
Describe the role of evaluations/assessments in contracting	N	N	N	N	N	F
Identify best practices for the frequency of evaluations/assessments	N	N	N	N	N	F
Describe the responsibilities for evaluations/assessments	N	N	N	N	N	F
Explain the impetus behind the process improvement focus.	N	N	N	N	N	F
Describe the structure of the Staged and Continuous representations of CMMI.	N	N	N	N	N	F
Describe the general guidelines for selecting either the Staged or Continuous representation	N	N	N	N	N	F
Identify the content of the CMMI Process Areas	N	N	N	N	N	F
Explain where to find more detailed information on applying CMMI	N	N	N	N	N	F
Identify appropriate metrics for visibility into development process, software product, system progress	N	N	N	N	F	N
Describe metrics Collection methodologies	N	N	N	N	P	N
Identify best practices for Metrics Interpretation	N	N	N	N	P	N

Describe bench marking practices	N	N	N	N	F	N
Describe data management technologies and methods for DoD [Software Acquisition] programs.	N	N	N	N	F	N
Explain the types and use of measures/metrics in a [Software] acquisition.	N	N	N	N	F	N
Analyze Software Technical Life Cycle & Relate it to System Acquisition Process						
Identify current approaches (e.g., Functional, Object-Oriented)	N	N	N	N	F	N
Describe strengths and weaknesses of design approaches	N	N	N	N	F	N
Describe the effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	N	N	N	N	F	N
Identify Software Design Guidance (laws, regs, Stds)	N	P	N	N	F	N
Define Technical fundamentals	N	F	N	N	P	N
Identify Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	N	F	N	N	P	N
List criteria for Paradigm selection	N	F	N	N	P	N
Describe the risks and benefits of each development	N	F	N	N	P	N
Describe paradigm selection resource/management issues	N	F	N	N	P	N
Recognize software measures, development models, paradigms, and strategies appropriate for use in software-intensive acquisitions.	N	P	N	N	F	N
Define key [Software] systems and software engineering terms, concepts, and methodologies.	N	P	N	N	F	N
Describe how the eight technical processes can be applied in top-down development and bottom up product realization.	N	F	N	N	P	N
Describe how the eight technical management processes are used to control and assess systems engineering (SE) activities.	N	F	N	N	N	N
Describe the role of a systems model, the work breakdown structure (WBS), standards, top-down design, bottom-up product realization, and the Systems Engineering Plan (SEP).	N	F	N	N	N	N
Describe the role SE management plays in acquisition programs.	N	F	N	N	N	N
Explain the relationship between software engineering and systems engineering.	N	N	N	N	F	N
Describe the SE process and its application throughout a system's life cycle.	N	F	N	N	N	N
Explain the importance of rigorously applying SE principles and practices.	N	F	N	N	N	N
Explain the relationship of the software development life cycle to the overall system acquisition process.	F	N	N	N	P	N
Recognize the complexity of the software development process to the acquisition life cycle.	F	N	N	N	P	N
Identify Cost Factors	N	N	N	N	F	N
List key Software support transition issues	N	N	N	N	F	N
Describe Organic/Outsourcing Post Deployment Software Support considerations	N	N	N	N	F	N
Describe considerations for Software Engineering Environment acquisition & use	N	N	N	N	F	N
Identify DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	F	N	N	N	P	N
Describe Support Organization Involvement	N	N	N	N	F	N
Define Continuous process improvement	N	N	N	N	N	F
Describe End User Involvement	N	F	N	N	N	N
Describe Corrective Actions Management	N	N	N	N	F	N
Define Contract Baseline	N	N	N	N	F	N
Describe the relationship with contractor(s)	N	N	N	N	F	N
Identify DoD [Software Acquisition] Management regulations, goals, and procedures.	N	N	N	N	F	N
Describe [Software Acquisition] life cycle budget execution goals and objectives.	N	N	N	N	F	N
Identify the concepts of change management.	N	N	N	N	F	N
Describe examples of the technical, contractual, and personal issues involved in deploying a [Software] system.	N	N	N	N	F	N
Identify [Software Acquisition] Life Cycle Management documentation requirements.	N	N	N	N	F	N
Recognize the importance of supportability to achieving system readiness requirements and reducing life-cycle costs.	F	N	N	N	N	N
Discuss supportability requirements that must be met prior to acquisition or modification of a new/existing [software-intensive] system.	N	F	N	N	N	N
Explain the support activities and requirements associated with fielding/deployment and post-production support of software-intensive systems.	N	N	N	N	F	N
Identify key software support transition issues.	N	P	N	N	F	N
Define Joint Technical Architecture (JTA) [or its equivalent, e.g., DoDAF]	N	F	N	N	P	N
Describe considerations in domain & product line engineering	N	F	N	N	N	N
Identify state of the art software technology topics	N	N	N	N	F	N

Explain at least two [Software] technologies relative to DoD systems development.	N	N	N	N	F	N
Describe how modeling and simulation (M&S) can benefit over the entire life cycle of a software-intensive acquisition project.	N	P	N	N	P	N
Recognize the integral nature of systems software in modern defense systems and the policies applicable to software intensive systems.	F	N	N	N	F	N
Indentify and describe modeling and simulation approaches.	N	P	N	N	P	N
Software Testing "Best Practices" Application						
Define IV&V, and describe benefits and disadvantages	N	F	N	N	F	N
Identify IV&V levels	N	P	N	N	N	N
Identify IV&V guidance	N	P	N	N	F	N
Describe the IV&V relationship to risk management and testing	N	F	N	N	N	N
Describe the IV&V effect on development schedule	N	P	N	N	P	N
Describe the discipline of Software Verification, Validation, and Accreditation (V,V&A)	N	F	N	N	F	N
Give examples of software quality factors	N	N	N	N	F	N
Give examples of software quality guidance	N	N	N	N	F	N
Explain quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	N	N	N	N	F	N
Explain the benefits and risks associated with software quality methods	N	N	N	N	F	N
Give examples of best practices for Software Project Management visibility into software quality (metrics and inspections)	N	N	N	N	F	N
Give examples of Software Product Assessment Techniques	N	N	N	N	F	N
Summarize Software Quality Assurance Planning and Techniques	N	N	N	N	F	N
Identify requirements, methods, and techniques for quality assurance during the system life cycle.	N	N	N	N	F	N
Describe the discipline of software Quality	N	N	N	N	F	N
Software Acquisition Management Planning & Status Documentation analysis						
Define Software Requirement management	N	N	N	N	F	N
Identify Requirement Management guidance	N	N	N	N	F	N
Describe Requirement Management responsibilities	N	N	N	N	F	N
Describe User involvement	N	N	N	N	F	N
Identify Requirement Planning issues	N	N	N	N	F	N
Identify types of requirements (derived, explicit, decomposed)	N	F	N	N	N	N
Define software requirements, and describe the benefits and risks of prototyping	N	N	N	N	F	N
Describe Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	N	N	N	N	F	N
Describe Requirements/COTS issues	N	N	N	N	F	N
Identify Critical measures of effectiveness for operational issues and criteria	N	N	N	N	F	N
Describe the requirements development process.	N	N	N	N	F	N
Define software acquisition and information technology management-specific terms and concepts.	N	N	N	N	F	N
Describe the Government management of reviews and audit process	F	N	N	N	N	N
Identify high interest Software issues and their indicators	N	N	N	N	F	N
Describe Critical Software life cycle reviews	N	N	N	N	F	N
List key Software review questions and data	N	N	N	N	F	N
Identify Entrance & Exit Criteria	N	N	N	N	F	N
Describe the Software review relationship to system reviews	N	F	N	N	N	N
Software Economic Factors analysis						
Describe the strengths and weaknesses of methods and models used for SW cost & schedule estimation	P	N	P	N	F	N
Describe SW cost & schedule reporting	N	N	P	N	F	N
Describe the validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	N	N	N	N	F	N
Identify Life Cycle Costs (incl PDSS)	P	N	P	N	F	N
Identify elements of Planning, Programming, and Budgeting System (PPBS).	P	N	N	N	F	N
Explain the requirements and factors involved in assessing program costs and returns.	P	N	N	N	F	N
Identify the purpose and process of Earned Value Management (EVM) and Recognize the value and benefits of EVM in the software acquisition process.	F	N	N	P	N	N
Describe the requirements for conducting an economic analysis for a [Software] system in the DoD Life Cycle Management process. Identify examples of the	N	N	N	N	F	N

factors included in an economic analysis for a [Software] system.						
Explain the role, process, and elements of market research in a [Software Acquisition].	N	N	N	N	F	N
Define Business Process Reengineering (BPR)	N	N	N	N	N	F
Identify best practices for adapting maturing technologies	N	N	N	N	F	N
Define the Development Information System/Enterprise	N	N	N	N	F	N
Identify FPI Guidance, Process, Tools	N	N	N	N	N	F
Describe Model Relationship	N	N	N	N	N	F
Describe the impetus behind the process improvement focus.	N	N	N	N	N	F

E-1.2 Level II Program Management Gap Analysis

• N – The course did not apply to competency. • P - The competency has been partially satisfied by the identified training course. • F – The competency has been satisfied by the identified training course.	**ACQ 201 (A&B):** Intermediate Systems Acquisition Mgmt	**PMT 250:** Program Mgmt Tools	**CON 110:** Mission Planning Support	**SAM 101: Basic SW Acquisition Mgmt**	**SAM 201**: Intermediate SW Acquisition Mgmt	AFIT/**CSE 481:** Intro to SW Engineering	AFIT/**CSE 479:** SW Project Initiating and Planning	**BCF 208:** SW Cost Estimating	**CLE 015:** Continuous Process Improvement	NAVAIR CMMI
	Level II									
	DAWIA				**Additional**					
Software Acquisition Management Regulatory/Technical Framework Application & Analysis										
Give examples of best system strategies for SW intensive systems	N	N	N	F	F	N	N	N	N	N
Explain the effect of current system Strategies on SW Acquisition Mgmt	N	N	N	F	F	N	N	N	N	N
Summarize the strengths and weaknesses of current strategies	N	N	N	F	F	N	N	N	N	N
Explain the impact of acquisition strategy on SW project planning and SW Engineering methods	P	N	N	F	F	N	N	N	N	N
Explain the impact of Acquisition Reform	F	N	N	F	F	N	N	N	N	N
Using a software-intensive system, identify acquirer key planning roles and activities. Describe "best practices" for software-intensive systems acquisitions and development that acquirers may use.	F	N	N	N	N	N	N	N	N	N
Given descriptions of acquisition strategies, issues, risks, software-intensive system, select an appropriate acquisition strategy over the life cycle of the system; select an appropriate software development paradigm within that strategy; explain how modeling, simulation, and prototyping help with this process.	N	N	N	N	F	N	N	N	N	N
Given materials on applicable Federal laws and DoD acquisition policies, determine legal and policy requirements that apply to a given software-intensive system	N	N	N	N	F	N	N	N	N	N
Include COTS-based systems where appropriate when formulating software acquisition strategies.	N	N	N	N	F	N	N	N	N	N
For current laws and policies, identify key software acquisition management activities that should be emphasized during the acquisition of a DoD software intensive system.	F	N	N	N	N	N	N	N	N	N
Summarize Software Architecture Fundamentals	N	N	N	F	F	N	N	N	N	N
Explain the relationship of SW to System Architecture	N	N	N	F	F	N	N	N	N	N
Explain the relationship of Architecture to SW Design	N	N	N	F	F	N	N	N	N	N
Explain the Impact of architecture on interoperability and reuse	N	N	N	N	F	N	N	N	N	N
Distinguish between C3I, MCCR, and AIS systems	N	N	N	N	F	N	N	N	N	N
Summarize best practices for evaluating and acquiring target environments	N	N	N	N	F	N	N	N	N	N
Give examples of product line & domain engineering considerations (tradeoffs & analysis)	N	N	N	N	F	N	N	N	N	N
Explain the differences among documentation frameworks (e.g., the Federal Enterprise Architecture Framework (FEAF), the Department of Defense Architecture Framework (DODAF), or the Zachman Framework) and architecture reference models such as those provided in the Federal Enterprise Architecture (FEA).	N	N	N	P	P	F	N	N	N	N
Describe basic architecture documentation (i.e., work product) methodologies at each level of a commonly used framework (e.g., Zachman, FEAF or DODAF).	N	N	N	P	P	F	N	N	N	N
Identify the purpose and timing of the SE process outputs over the life cycle, such as program-unique specifications, IT architectures, technical data packages, and other system-specific information.	F	N	N	N	N	N	N	N	N	N
Give examples of Interoperability and Data Administration Issues	N	N	N	F	F	N	N	N	N	N
Summarize Interoperability and data administration guidance (Laws, regulation, and standards)	N	N	N	F	F	N	N	N	N	N
Explain the relationship of Software/System Architecture and interoperability	N	N	N	F	F	N	N	N	N	N
Explain the Software Architecture/reuse relationship	N	N	N	N	P	F	F	N	N	N
Explain risk mitigation through reuse	N	N	N	N	N	F	N	N	N	N
Summarize reuse guidance	N	N	N	N	F	F	N	N	N	N

Explain Domain specific reuse paradigm	N	N	N	N	N	F	N	N	N	N
Give examples of existing Reuse repositories	N	N	N	N	N	F	N	N	N	N
Explain contracting mechanisms for reuse	N	N	N	N	P	P	F	N	N	N
Explain the impact of Open Systems on software reuse	N	N	N	N	N	F	N	N	N	N
Give examples of COTS/Reuse Issues	N	N	N	N	F	N	F	N	N	N
Explain portability, through platform independence	N	N	N	N	F	F	P	N	N	N
Software Risk Management Application & Analysis										
Demonstrate Software Risk Analysis	N	N	N	N	F	N	N	N	N	N
Solve Software Risk management issues (planning, etc.)	N	N	N	N	F	N	N	N	N	N
Demonstrate the benefit of varying the risk profile through life cycle	N	N	N	N	F	N	N	N	N	N
Select Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.) appropriate to a given case situation	N	F	N	N	N	N	N	N	N	N
Use Risk Management guidance	N	N	N	N	F	N	N	N	N	N
Summarize the concept of a Domain Competent Work Force	N	N	N	F	F	N	N	N	N	N
Given programmatic documentation for a given software-intensive system, justify appropriate risk handling methods for that system.	P	N	N	N	F	N	N	N	N	N
Using a software acquisition system, apply the risk management process as a basis for making sound software acquisition program decisions.	N	N	N	N	F	N	N	N	N	N
Identify software engineering risks and apply appropriate software risk management methodologies	N	N	N	N	F	N	N	N	N	N
Incorporate risk management strategies into software project planning and management.	N	N	N	N	F	N	N	N	N	N
Give examples of Software security considerations	N	N	N	N	F	P	N	N	N	N
Summarize Security Risk Management	N	N	N	N	F	N	N	N	N	N
Summarize Software security guidance (regulations, standards, "orange book")	N	N	N	F	F	N	N	N	N	N
Explain System Certification	N	N	N	N	F	N	N	N	N	N
Give examples of contemporary security developments	N	N	N	N	F	P	N	N	N	N
Given a notional software-intensive system, describe software information assurance requirements appropriate to the overall development and acquisition of that system.	N	N	N	N	F	N	N	N	N	N
Given information about a software-intensive system, identify software safety and reliability issues for the system.	N	N	N	N	F	N	N	N	N	N
Government and Industry Software Acquisition Management roles										
Utilize Standards for Configuration Mgt	N	N	N	N	F	N	N	N	N	N
Demonstrate Configuration Mgt Planning	P	N	N	N	F	N	N	N	N	N
Demonstrate the use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	P	N	N	N	F	N	N	N	N	N
Demonstrate the synchronization of HW and SW baselines	N	N	N	N	F	N	N	N	N	N
Utilize Configuration Management CASE tools	N	N	N	N	N	F	N	N	N	N
Demonstrate the management of Configuration Risks	N	N	N	N	F	N	N	N	N	N
Identify the role and functions of configuration management in the acquisition process.	F	N	N	N	N	N	N	N	N	N
Given a software-intensive system, select software configuration management (CM) activities and issues that are appropriate to the various development phases of a software-intensive system.	N	N	N	N	F	N	N	N	N	N
Explain the fundamentals of Configuration Management (CM) in software systems.	N	N	N	N	F	N	N	N	N	N
Demonstrate Staffing best practices.	N	N	N	N	F	N	N	N	N	N
Demonstrate Organizational best practices	N	N	N	N	F	N	N	N	N	N
Demonstrate best practices for Matrix Support Groups	P	P	N	N	F	N	N	N	N	N
Demonstrate Resource Management best practices	F	N	N	N	N	N	N	N	N	N
Demonstrate best practices for Project Control	P	P	N	N	F	N	N	N	N	N
Demonstrate best practices for Project Tracking	P	P	N	N	F	N	N	N	N	N
Demonstrate End User Involvement	N	N	N	N	N	F	N	N	N	N
Demonstrate best practices for IPT's and working groups	P	P	N	N	F	N	N	N	N	N
Demonstrate best practices for Intergroup Coordination	P	P	N	N	F	N	N	N	N	N

Select Corrective Actions	N	P	N	N	F	N	N	N	N	N
Utilize Lessons Learned	P	N	N	N	F	N	N	N	N	N
Demonstrate best practices to deal with Management Issues	P	P	N	N	F	N	N	N	N	N
Given background materials on ISAM course competencies and DoD Acquisition environment, relate ISAM lesson topics to individual learning needs and describe the typical roles played by software management professionals.	P	N	N	N	F	N	N	N	N	N
Describe the role of the project manager is software project initiating and planning.	N	N	N	N	N	N	F	N	N	N
Compare the roles and responsibilities of the systems engineering effort across government and contractor boundaries (e.g., Chief Engineer, Lead Systems Engineer, IPT members, etc.) has in regards to the implementation of systems engineering and software engineering.	P	N	N	N	F	N	N	N	N	N
Interact with software program integrated product teams regarding the application of the systems engineering process to their respective area of expertise.	P	N	N	N	F	N	N	N	N	N
Unique Software Procurement Requirements Application & Analysis										
Prepare a SW Development Plan (SDP)	N	N	N	N	N	P	F	N	N	N
Use a SDP in a proposal evaluation	N	N	N	N	N	P	F	N	N	N
Prepare a Work Break-down Structure (WBS) for SW	N	N	N	N	N	P	F	N	N	N
Select Laws/regulation related to SOW and RFP	N	N	F	N	P	N	N	N	N	N
Prepare solutions for Quality Issues	N	N	N	N	F	N	N	N	N	N
Select Contract types based on their strengths and weaknesses (for all types of systems)	P	N	F	N	P	N	N	N	N	N
Select Deliverables (based on issues and tradeoffs)	N	N	N	N	F	N	N	N	N	N
Demonstrate a SW Proposal Evaluation	N	N	N	N	F	N	N	N	N	N
Incorporate Data and intellectual property rights	N	N	P	N	P	N	N	N	N	N
Incorporate Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	N	N	N	N	N	N	F	N	N	N
Prepare Model SOWs	P	P	F	N	P	N	N	N	N	N
Describe the role of contracts in software acquisition management and software engineering.	F	N	N	N	N	N	N	N	N	N
Given a software-intensive system and a systems-level acquisition strategy, choose key practices considered essential to contracting for such a system; and identify key activities, tasks, and criteria considered essential for effective proposal evaluation and selection of the best-qualified contractor for that system.	N	N	N	N	F	N	N	N	N	N
Summarize the role of contracting in the software acquisition process and the major contractual contributions towards managing program risk.	F	N	N	N	N	N	N	N	N	N
Analyze given proposals and select the best-qualified contractor for a given software-intensive system acquisition.	N	N	F	N	P	N	N	N	N	N
Analyze given proposals and requirements and select the best-qualified contractor for the acquisition of software development services.	N	N	F	N	P	N	N	N	N	N
Develop a plan to implement data rights and intellectual property policies within a software-intensive acquisition program.	N	N	P	N	P	N	N	N	N	N
Give examples of Open System Migration issues	N	N	N	N	N	N	F	N	N	N
Summarize Open System guidance (Application Portability Profile, regulations, standards)	N	N	N	N	N	N	F	N	N	N
Explain Open System adaptation effect on acquisition	N	N	N	N	P	N	F	N	N	N
Give examples of Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	N	N	N	N	N	N	F	N	N	N
Given system requirements and a software application domain, assess life cycle impacts and risks of using COTS and NDI/GOTS as part of computer resource planning and support.	N	N	N	N	F	N	N	N	N	N
Software Metrics Application & Analysis										
Explain the roles of assessments/evaluations	N	N	N	N	N	N	N	N	N	F
Demonstrate methods available to assess maturity	N	N	N	N	N	N	N	N	N	F
Distinguish the strengths and weaknesses of current methods	N	N	N	N	N	N	N	N	N	F
Demonstrate different applications of assessments and evaluations	N	N	N	N	N	N	N	N	N	F
Demonstrate the role of evaluations/assessments in contracting	N	N	N	N	N	N	N	N	N	F
Select the frequency of evaluations/assessments	N	N	N	N	N	N	N	N	N	F
Summarize responsibilities for evaluations/assessments	N	N	N	N	N	N	N	N	N	F
Compare the three CMMIs - Development, Acquisition, and Services - and their intended environments.	N	N	N	N	N	N	N	N	N	F

For each PA in maturity levels 2 and 3, describe the typical activities and typical work products that can be expected in an organization that has implemented processes consistent with the PA	N	N	N	N	N	N	N	N	N	F
Compare and contrast the Software CMM and the CMMI	N	N	N	N	N	N	N	N	N	F
Explain how CMMI Process Areas (PA) relate to a software or systems engineering life cycles	N	N	N	N	N	N	N	N	N	F
Describe the CMMI's basic structure and components.	N	N	N	N	N	N	N	N	N	F
Explain the meaning of capability levels and maturity levels.	N	N	N	N	N	N	N	N	N	F
Describe the interrelationships between CMMI components.	N	N	N	N	N	N	N	N	N	F
Identify the CMMI Process Areas.	N	N	N	N	N	N	N	N	N	F
Locate relevant information in CMMI models.	N	N	N	N	N	N	N	N	N	F
Describe the environments for which CMMI is best suited.	N	N	N	N	N	N	N	N	N	F
Describe the role of CMMI-based process discipline in acquisition environments.	N	N	N	N	N	N	N	N	N	F
Explain the use of process and CMMI appraisals in acquisition.	N	N	N	N	N	N	N	N	N	F
Identify best practices in using statistics and measures to quantify, plot, and analyze software development in order to manage and improve software acquisition processes.	N	N	N	N	N	N	N	N	P	P
Select appropriate metrics for visibility into development process, software product, system progress	N	N	N	N	F	N	N	N	N	N
Select metrics collection methodologies	N	N	N	N	P	N	N	N	P	N
Demonstrate Metrics Interpretation	N	N	N	N	F	N	N	N	N	N
Demonstrate Bench marking practices	N	N	N	N	F	N	N	N	N	N
Develop a Measurement Plan and establish baseline measures.	N	N	N	N	F	N	N	N	N	N
Evaluate project/program performance metrics as indicators of problems in software-intensive acquisition programs.	P	N	N	N	F	N	N	N	N	N
Analyze Software Technical Life Cycle & Relate it to System Acquisition Process										
Distinguish among current approaches (e.g., Functional, Object-Oriented)	N	N	N	N	N	F	N	N	N	N
Explain the strengths and weaknesses of design approaches	N	N	N	N	N	F	N	N	N	N
Explain the effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	N	N	N	N	N	F	N	N	N	N
Summarize Software Design Guidance (laws, regs, Stds)	N	N	N	P	P	F	N	N	N	N
Summarize technical fundamentals	N	N	N	N	N	F	N	N	N	N
Distinguish among Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	N	N	N	N	P	F	N	N	N	N
Give examples of criteria for Paradigm selection	N	N	N	P	P	F	N	N	N	N
Explain the risks and benefits of each development	N	N	N	N	N	F	N	N	N	N
Summarize paradigm selection resource/management issues	N	N	N	N	P	F	N	N	N	N
Describe approaches to creating and documenting the structure of a software system.	N	N	N	N	N	F	N	N	N	N
List common programming or scripting languages.	N	N	N	N	N	F	N	N	N	N
Using a software-intensive system and software development planning information, identify key practices that can be used by developers to create a quality software product.	F	N	N	N	P	N	N	N	N	N
Given a software-intensive system and a draft software development plan, analyze the plan for sufficiency and coverage of project specific software acquisition and development issues.	N	N	N	N	F	N	N	N	N	N
Describe the concept of agile software development.	N	N	N	N	N	N	F	N	N	N
Given software-intensive system requirements and current DoD policies, assess the impacts of DoD interoperability policies, requirements, applicable architectures and open systems concepts on the acquisition, development, and support of a software-intensive system.	N	N	N	N	F	N	N	N	N	N
Given requirements documents, acquisition strategy information, risk assessments, and other programmatic documentation for a software-intensive system, develop a feasible build plan for the system.	N	N	N	N	F	N	N	N	N	N
Explain the importance of accounting for maintenance in software acquisition and development.	N	N	N	N	N	N	F	N	N	N
Describe the similarities between software maintenance and software development.	N	N	N	N	N	F	N	N	N	N
Estimate the maintenance effort involved in a software system and evaluate risks associated with continued maintenance vs. redevelopment.	N	N	N	N	N	F	N	N	N	N
Explain Cost Factors identification	N	N	N	P	P	N	F	N	N	N
Summarize Key Software support transition issues	N	N	N	N	F	N	N	N	N	N

Summarize Organic/Outsourcing Post Deployment Software Support considerations	N	N	N	N	F	N	N	N	N	N
Summarize considerations for Software Engineering Environment acquisition & use	N	N	N	N	F	N	N	N	N	N
Summarize DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	F	N	N	N	F	N	N	N	N	N
Give examples of Support Organization Involvement	N	F	N	N	F	N	N	N	N	N
Explain continuous process improvement	N	N	N	N	N	F	F	N	N	N
Give examples of End User Involvement	N	N	N	N	N	N	F	N	N	N
Explain Corrective Actions Management	N	N	N	N	F	N	N	N	N	N
Explain Contract Baseline	P	F	N	N	P	N	N	N	N	N
Explain the relationship with contractor(s)	P	F	N	N	P	N	N	N	N	N
Explain how software acquisition activities impact and relate with other functional areas within the software acquisition life cycle.	N	N	N	N	N	F	N	N	N	N
Describe software lifecycle models.	N	N	N	N	N	F	F	N	N	N
Describe the phases of the software development life cycle to include requirements analysis, design, implementation, test & evaluation, and maintenance.	N	N	N	N	N	F	N	N	N	N
Describe key logistics support elements to consider in software product support/sustainability planning and management	F	N	N	N	N	N	N	N	N	N
Given a software-intensive system in the latter stages of development, identify key issues for deploying it, transitioning its maintenance, and disposing of it.	N	N	N	N	F	N	N	N	N	N
Distinguish between system development life cycle and the system life cycle.	F	N	N	N	N	N	N	N	N	N
Select appropriate software lifecycle models for a given system.	N	N	N	N	N	N	F	N	N	N
Justify the importance of software supportability to achieving system readiness requirements.	F	N	N	N	N	N	N	N	N	N
Given a software acquisition system, identify critical program management and logistics decisions concerning software system supportability issues and alternatives that would optimize software system design for supportability.	F	N	N	N	N	N	N	N	N	N
Explain Joint Technical Architecture (JTA) [or its equivalent, e.g., DoDAF]	N	N	N	N	N	F	N	N	N	N
Explain Domain & product line engineering	N	N	N	N	N	F	N	N	N	N
Explain state of the art software technology topics	N	N	N	N	F	F	N	N	N	N
Compare and contrast, in the changing DoD environment, the impacts of major institutional players, major new software acquisition initiatives, and policies specific to defense software acquisition management.	F	N	N	N	N	N	N	N	N	N
Compare and contrast among modeling and simulation tools, demonstrating that the tools chosen appropriately offer productivity, reliability, availability, and accessibility in support of the organization's missions.	N	N	N	N	P	N	N	N	N	N
Software Testing "Best Practices" Application										
Summarize IV&V definition, benefits, and disadvantages	N	N	N	F	F	N	N	N	N	N
Explain how to determine IV&V levels	N	N	N	N	P	N	N	N	N	N
Summarize IV&V guidance	N	N	N	P	F	N	N	N	N	N
Explain IV&V relationship to risk management and testing	N	N	N	N	P	N	N	N	N	N
Explain IV&V effect on development schedule	N	N	N	P	P	N	N	N	N	N
Describe the differing roles of validation, verification, and testing	N	N	N	P	F	P	N	N	N	N
Explain how V&V and testing fits in the software lifecycle	N	N	N	P	F	F	N	N	N	N
Identify different V&V techniques and tools	N	N	N	N	P	P	N	N	N	N
Outline Software quality factors	N	N	N	P	F	N	N	N	N	N
Outline Software quality guidance	N	N	N	P	F	N	N	N	N	N
Illustrate Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	N	N	N	N	F	N	N	N	N	N
Illustrate the benefits and risks associated with software quality methods	N	N	N	N	F	N	N	N	N	N
Illustrate best practices for Software Project Management visibility into software quality (metrics and inspections)	N	N	N	N	F	N	N	N	N	N
Outline Software Product Assessment Techniques	N	N	N	N	F	N	N	N	N	N
Outline Software Quality Assurance Planning and Techniques	N	N	N	N	F	N	N	N	N	N
Explain the fundamentals of Software Quality Assurance in software systems.	N	N	N	N	F	N	N	N	N	N
Interpret evaluations on the quality of software based on factors such as modularity, maintainability, complexity, and algorithm analysis.	N	N	N	N	F	N	N	N	N	N

Describe the different meanings of software quality and their associated measures.	N	N	N	N	F	N	N	N	N	N
Distinguish Software testing Phases (DT&E, F/OT&E)	P	N	N	N	F	N	N	N	N	N
Give examples of appropriate Testing metrics (software maturity, error density)	P	N	N	N	F	N	N	N	N	N
Give examples of types of Testing (unit, FOT, integration, DT/OT).	P	N	N	N	F	N	N	N	N	N
Summarize Software integration testing issues	N	N	N	N	F	N	N	N	N	N
Explain sufficient software testing	N	N	N	N	F	N	N	N	N	N
Explain Test and Evaluation Master Plan relationship to Testing	F	N	N	N	N	N	N	N	N	N
Explain High Integrity Systems	N	N	N	N	F	N	N	N	N	N
Explain the identification of Testing Risks	N	N	N	N	F	N	N	N	N	N
Describe the discipline of Software Reliability	N	N	N	N	F	N	N	N	N	N
Describe the different types of Test and Evaluation (T&E), the organizations responsible for them, and the reason for heavy DoD commitment to T&E.	P	N	N	N	P	P	N	N	N	N
Describe key software testing and evaluation elements to consider in software acquisition management and software engineering.	N	N	N	N	F	N	N	N	N	N
Given previous instruction on software testing and a software-intensive system, assess software and system test processes for effectiveness.	N	N	N	N	F	N	N	N	N	N
Discuss available tools, techniques, and metrics for software testing.	P	N	N	N	P	P	N	N	N	N
Explain how to incorporate software testing and evaluation elements into software project planning and management (Pareto's law and the impact of core requirements - i.e., 80% of the design and testing is up front before coding begins).	N	N	N	N	N	F	N	N	N	N
Software Acquisition Management Planning & Status Documentation analysis										
Summarize Software Requirement management	N	N	N	P	F	F	N	N	N	N
Summarize Requirement Management guidance	P	N	N	P	F	P	N	N	N	N
Summarize Requirement Management responsibilities	N	N	N	P	F	P	N	N	N	N
Explain User involvement	N	N	N	F	F	P	N	N	N	N
Give examples of Requirement Planning issues	N	N	N	P	F	P	N	N	N	N
Distinguish among the types of requirements (derived, explicit, decomposed)	N	N	N	N	N	F	N	N	N	N
Give examples of software requirements, and describe the benefits and risks of prototyping	N	N	N	N	P	F	N	N	N	N
Give examples of Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	N	N	N	N	F	P	N	N	N	N
Give examples of Requirements/COTS issues	N	N	F	N	F	P	N	N	N	N
Explain Critical measures of effectiveness for operational issues and criteria	N	N	N	N	P	F	N	N	N	N
Given a software-intensive system within an application domain, select appropriate software requirements management methodologies and techniques.	N	N	N	N	F	N	N	N	N	N
Summarize the Government management of reviews and audit process	N	F	N	N	N	N	N	N	N	N
Give examples of high interest Software issues and their indicators	N	N	N	P	P	F	N	N	N	N
Summarize Critical Software life cycle reviews	N	N	N	P	P	F	N	N	N	N
Give examples of key Software review questions and data	N	N	N	P	P	F	N	N	N	N
Give examples of Entrance & Exit Criteria	N	N	N	P	P	F	N	N	N	N
Explain the Software review relationship to system reviews	N	N	N	N	N	F	N	N	N	N
Software Economic Factors analysis										
Select methods and models for SW cost & schedule estimation based on their strengths and weaknesses	P	N	N	N	P	N	P	F	N	N
Demonstrate SW cost & schedule reporting	N	N	N	N	F	N	P	N	N	N
Demonstrate validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	N	N	N	N	F	N	F	N	N	N
Predict Life Cycle Costs (incl PDSS)	P	N	N	N	P	N	F	N	N	N
Given knowledge of the software cost and schedule cost estimating process, assess techniques that can be used in preparing cost and schedule estimates for software-intensive systems.	N	N	N	N	F	N	N	N	N	N
Given various cost estimating tools and summary information about a software-intensive system, develop an initial cost and schedule estimate for that system.	N	N	N	N	F	N	N	N	N	N
Given cost estimation tools and preliminary software development cost and schedule estimates for a software-intensive	N	N	N	N	F	N	N	N	N	N

system, justify an appropriate "should cost" estimate for that system.										
Describe the basics of software size and effort estimates.	N	N	N	N	N	N	F	N	N	N
Describe the basics of creating and monitoring software schedules.	N	N	N	N	N	N	F	N	N	N
Using EVM principles, create detailed work assignments and initialize a metrics tracking system.	N	F	N	N	N	N	N	N	N	N
Determine an appropriate cost-estimating methodology and the types of data required for a software cost estimate.	N	N	N	N	N	N	N	F	N	N
Identify and appropriately apply models for software life-cycle cost estimating	N	N	N	N	N	N	N	F	N	N
Compare and contrast alternative techniques for software cost estimating.	N	N	N	N	N	N	N	F	N	N
Describe and apply software cost-estimating techniques.	N	N	N	N	N	N	N	F	N	N
Discuss the strengths and weaknesses of software cost-estimating models.	N	N	N	N	N	N	N	F	N	N
Discuss major influences on software cost estimating.	N	N	N	N	N	N	N	F	N	N
Translate software cost estimates into acquisition program budgets.	F	N	N	N	N	N	N	N	N	N
Explain the major activities involved in evaluating and/or negotiating contract proposals.	P	N	N	N	N	N	N	F	N	N
Explain the major activities in conducting market research on a commercial software product to determine product availability and applicability.	N	N	F	N	N	N	N	N	N	N
Explain Business Process Reengineering (BPR)	N	N	N	N	N	N	N	N	N	F
Explain best practices for adapting maturing technologies	N	N	N	N	N	N	N	N	N	F
Describe the Development Information System/Enterprise	N	N	N	N	N	N	N	N	N	F
Give examples of FPI Guidance, Process, Tools	N	N	N	N	N	N	N	N	N	F
Explain Model Relationship	N	N	N	N	N	N	N	N	N	F
Describe the impetus behind the process improvement focus.	N	N	N	N	N	N	N	N	N	F
Explain the program manager's role and responsibilities in software process improvement.	N	N	N	N	N	N	N	N	F	F
Explain process improvement and CMMI roles and responsibilities.	N	N	N	N	N	N	N	N	N	F
Describe the impact of leadership in acquisition and process improvement.	N	N	N	N	N	N	N	N	N	F
Describe the value or benefits of model-based process improvement.	N	N	N	N	N	N	N	N	N	F
Describe different process models/methods to apply, and explain how and when to achieve process improvement.	N	N	N	N	N	N	N	N	N	F
Explain the cost of process improvement investment in project or product delivery.	N	N	N	N	N	N	N	N	F	F
Explain how to measure and report process improvement.	N	N	N	N	N	N	N	N	F	F
Describe the knowledge/skills necessary to effectively apply to process improvement.	N	N	N	N	N	N	N	N	F	F
Demonstrate the value of establishing periodic and timely reviews and reporting milestones in which [the software system] performance is evaluated against the [software system] plan.	P	N	N	N	F	N	N	N	N	N
Given programmatic documentation and project-specific measurement data for a software-intensive system, select and analyze performance measures appropriate to the system's acquisition life cycle; appraise tools and techniques available to the program office for planning, measuring and predicting software development, quality and process maturity.	N	N	N	N	F	N	N	N	N	N

E-1.3 Level III Program Management Gap Analysis

Comments • N – The course did not apply to competency. • P - The competency has been partially satisfied by the identified training course. • F – The competency has been satisfied by the identified training course.	**PMT 352 (A&B)**: Program Mgmt Office Course	**SYS 202:** Intermediate SPRDE	**SAM 301**: Advanced SW Acquisition Mgmt	NAVAIR CMMI
	Level I			
	DAWIA		**Additional**	
Software Acquisition Management Regulatory/Technical Framework Application & Analysis				
Discriminate best system strategies for SW intensive systems	N	N	F	N
Analyze the effect of current system Strategies on SW Acquisition Mgmt	N	N	F	N
Illustrate the strengths and weaknesses of current strategies	N	N	F	N
Outline the impact of acquisition strategy on SW project planning and SW Engineering methods	N	N	F	N
Outline the impact of Acquisition Reform	N	N	F	N
Summarize the strengths and weaknesses of incorporating software product reuse and Commercial Items products into the acquisition strategy of an information intensive system.	N	N	F	N
Evaluate software acquisition methodology for its ability to support an acquisition strategy.	N	N	F	N
Employ software acquisition strategies that are characterized by progressively defining requirements and associated design solutions based on evolving user needs.	N	N	F	N
Summarize Software Architecture Fundamentals	N	N	F	N
Show the relationship of SW to System Architecture	N	N	F	N
Show the relationship of Architecture to SW Design	N	N	F	N
Demonstrate the impact of architecture on interoperability and reuse	N	N	F	N
Differentiate between C3I, MCCR, and AIS systems	N	N	F	N
Demonstrate best practices for Evaluating and Acquiring target environments	N	N	F	N
Illustrate product line & domain engineering considerations (tradeoffs & analysis)	N	N	F	N
Assess the benefits and limitations that implementing a standards based architecture brings to the acquisition strategy for a software intensive system.	N	N	F	N
For a given system, defend the decision for an "open system" or "closed system".	N	F	P	N
Give examples of Interoperability and Data Administration Issues	N	N	F	N
Summarize Interoperability and data administration guidance (Laws, regulation, and standards)	N	N	F	N
Explain the relationship of Software/System Architecture and interoperability	N	N	F	N
Assess interoperability issues and their impacts on software acquisition.	N	N	F	N
Analyze the Software Architecture/reuse relationship	N	F	P	N
Show Risk mitigation through reuse	N	P	F	N
Outline Reuse guidance	N	P	F	N
Outline Domain specific reuse paradigm	N	F	P	N
Differentiate existing Reuse repositories	N	F	P	N
Illustrate contracting mechanisms for reuse	N	P	F	N
Outline the impact of Open Systems on software reuse	N	F	P	N
Outline COTS/Reuse Issues	N	P	F	N
Illustrate Portability, through platform independence	N	F	P	N
Software Risk Management Application & Analysis				
Illustrate Software Risk Analysis	N	F	N	N

Outline Software Risk management issues (planning, etc.)	N	F	F	N
Illustrate the benefit of varying risk profile through life cycle	N	F	N	N
Select Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.) appropriate to a given case situation	N	F	N	N
Outline Risk Management guidance	N	F	N	N
Illustrate the concept of a Domain Competent Work Force	N	F	N	N
Analyze the causes of cost, schedule, and performance problems in large software efforts.	N	N	F	N
Critique the contention that a software crisis exists and current strategies for addressing the crisis.	N	N	F	N
Apply and evaluate commonly used best practices risk management models.	N	P	F	N
Demonstrate Software security considerations	N	P	F	N
Demonstrate Security Risk Management	N	P	F	N
Utilize Software security guidance (regulations, standards, "orange book")	N	P	F	N
Describe System Certification	N	P	F	N
Utilize contemporary security developments	N	P	F	N
Evaluate the impact of security, safety and integrity requirements on the development of an acquisition strategy for software intensive systems.	N	P	F	N
Apply appropriate program security techniques to a software acquisition program.	N	P	F	N
Government and Industry Software Acquisition Management roles				
Utilize Standards for Configuration Mgt	N	F	N	N
Demonstrate Configuration Mgt Planning	N	P	F	N
Demonstrate the use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	N	F	N	N
Demonstrate the synchronization of HW and SW baselines	N	F	N	N
Utilize Configuration Management CASE tools	N	F	N	N
Demonstrate the management of Configuration Risks	N	F	N	N
Demonstrate Staffing best practices.	F	N	P	N
Demonstrate Organizational best practices	F	N	P	N
Demonstrate best practices for Matrix Support Groups	F	N	P	N
Demonstrate Resource Management best practices	F	N	P	N
Demonstrate best practices for Project Control	F	N	P	N
Demonstrate best practices for Project Tracking	F	N	P	N
Demonstrate End User Involvement	F	P	P	N
Demonstrate best practices for IPT's and working groups	F	P	P	N
Demonstrate best practices for Intergroup Coordination	F	P	P	N
Select Corrective Actions	F	P	P	N
Utilize Lessons Learned	F	P	P	N
Demonstrate best practices to deal with Management Issues	F	P	P	N
Evaluate the success factors for creating and sustaining cohesive teams within a software organization.	N	N	F	N
Analyze the organizational and cultural dynamics of program offices and software development teams.	N	N	F	N
Evaluate the suitability of alternative organization structures, including integrated product teams.	N	N	F	N
Describe the appropriate skills mix needed to staff a software project.	N	N	F	N
Unique Software Procurement Requirements Application & Analysis				
Analyze a SW Development Plan (SDP)	N	N	F	N
Analyze a SDP in a proposal evaluation	N	N	F	N
Analyze a Work Break-down Structure (WBS) for SW	N	N	F	N
Outline Laws/regulation related to SOW and RFP	N	N	F	N
Analyze solutions for Quality Issues	N	N	F	N
Select Contract types based on their strengths and weaknesses (for all types of systems)	N	N	F	N
Select Deliverables (based on issues and tradeoffs)	N	N	F	N
Analyze a SW Proposal Evaluation	N	N	F	N
Incorporate Data and intellectual property rights	N	N	P	N

Illustrate Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	N	F	N	N
Analyze Model SOWs	N	N	F	N
Design an acquisition philosophy or model that fits the organization's mission, needs, and culture. Among the factors considered include sourcing issues, type(s) of contract, modular contracting, award fees, use of subcontractors, etc.	N	N	F	N
Analyze the security implications of software assurance, as it applies to confidentiality, and integrity, including legislation dealing with source manufacturing. Include internal GOTS, external COTS, internet/intranet, legacy codes, applicable legislation regarding source manufacturing, and the types of individuals (US trained, foreign national H-1B visa holders, off-shore workforce, etc.) developing software.	N	N	F	N
Originate a complete solicitation that effectively communicates the software acquisition strategy and factors for award.	F	N	N	N
Give examples of Open System Migration issues	N	F	N	N
Summarize Open System guidance (Application Portability Profile, regulations, standards)	N	F	N	N
Explain Open System adaptation effect on acquisition	N	F	N	N
Give examples of Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	N	F	N	N
Software Metrics Application & Analysis				
Outline the roles of assessments/evaluations	N	N	N	F
Analyze methods available to assess maturity	N	N	N	F
Illustrate the strengths and weaknesses of current methods	N	N	N	F
Analyze different applications of assessments and evaluations	N	N	N	F
Outline the role of evaluations/assessments in contracting	N	N	N	F
Analyze the frequency of evaluations/assessments	N	N	N	F
Outline responsibilities for evaluations/assessments	N	N	N	F
Analyze metrics for visibility into development process, software product, system progress	N	N	F	N
Analyze metrics collection methodologies	N	N	P	N
Analyze interpretations of metrics	N	N	P	N
Analyze bench marking practices	N	N	F	N
Apply data administration and management elements, initiatives, methods, and technologies to an information systems acquisition program.	N	N	F	N
Evaluate and select software metrics that will provide insight into program status and facilitate early detection of potential problems.	N	N	F	N
Analyze Software Technical Life Cycle & Relate it to System Acquisition Process				
Select current approaches (e.g., Functional, Object-Oriented)	N	F	P	N
Select design approaches based on their strengths and weaknesses	N	F	P	N
Predict the effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	N	N	F	N
Use Software Design Guidance (laws, regs, Stds)	N	P	F	N
Summarize technical fundamentals	N	P	F	N
Distinguish among Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	N	F	P	N
Prepare for Paradigm selection	N	F	P	N
Select a development paradigm based on the risks and benefits of each	N	P	P	N
Summarize paradigm selection resource/management issues	N	F	F	N
Outline SE activities in the context of the various life cycle phases of the Defense acquisition framework.	N	F	F	N
Analyze the scope of SE and its relationship to other program management functions across the life cycle.	N	F	F	N
List important design considerations and their impacts	N	F	F	N
Identify and explain technical processes that can be applied to control and assess systems engineering (SE) activities for software-intensive systems.	N	F	F	N
Select an appropriate reengineering strategy to implement, develop, and integrate a software intensive system.	N	N	F	N
Evaluate and manage a SE process to translate requirements into integrated design solutions, ensuring that solutions both meet current requirements and facilitate the incorporation of new technologies and capabilities to meet future needs.	F	N	P	N
Develop key portions of a Systems Engineering Plan.	N	F	P	N
Describe and analyze the software development and acquisition process.	F	P	P	N
Illustrate Cost Factors identification	N	N	F	N
Outline Key Software support transition issues	N	N	F	N
Outline Organic/Outsourcing Post Deployment Software Support	N	N	F	N

Analyze considerations for Software Engineering Environment acquisition & use	N	N	F	N
Outline DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	N	N	F	N
Illustrate Support Organization Involvement	N	N	F	N
Illustrate Continuous process improvement	P	N	N	F
Illustrate End User Involvement	N	F	P	N
Outline Corrective Actions Management	N	N	F	N
Prepare a Contract Baseline	N	N	F	N
Explain the relationship with contractor(s)	N	N	F	N
Evaluate the different parts of the life cycle to achieve a useful and cost effective outcome.	N	F	N	N
Evaluate acquisition logistics functions and documentation needs over a software system's life cycle, including organic/outsourcing post deployment software issues, and commercial production and support.	F	N	N	N
Explain Joint Technical Architecture (JTA) [or its equivalent, e.g., DoDAF]	N	F	P	N
Explain Domain & product line engineering	N	F	P	N
Explain state of the art software technology topics	N	N	F	N
Analyze the use of advanced technology tools such as integrated product teams, modeling and simulation, and open systems architectures, to further facilitate management of a developing system.	P	N	F	N
Evaluate the impact of Congressional and Federal acquisition reform initiatives on acquisition management for software intensive systems.	N	N	F	N
Assess the impact of current/emerging law upon software acquisition and use.	N	N	F	N
Formulate and describe strategies to influence Defense software acquisition policies, strategies, plans and procedures.	N	N	F	N
Evaluate benefits, limitations and tradeoffs of modeling, simulation and prototyping as tools supporting the program life cycle.	N	N	F	N
Software Testing "Best Practices" Application				
Summarize IV&V definition, benefits, and disadvantages	N	F	N	N
Explain how to determine IV&V levels	N	F	N	N
Summarize IV&V guidance	N	F	N	N
Explain IV&V relationship to risk management and testing	N	F	N	N
Explain IV&V effect on development schedule	N	F	N	N
Evaluate evidence that a system element meets the defined requirements ("build-to specification) of a given software-intensive system.	N	N	F	N
Analyze Software quality factors	N	N	F	N
Modify Software quality guidance	N	N	F	N
Analyze Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	N	N	F	N
Analyze the benefits and risks associated with software quality methods	N	N	F	N
Create a plan to allow Software Project Management visibility into software quality (metrics and inspections)	N	N	F	N
Analyze Software Product Assessment Techniques	N	N	F	N
Create a Software Quality Assurance Plan	N	N	F	N
Choose appropriate software quality management methodologies based on cost, schedule, and performance risk management considerations.	N	N	F	N
Differentiate Software testing Phases (DT&E, F/OT&E)	N	N	F	N
Discriminate appropriate Testing metrics (software maturity, error density)	N	N	F	N
Discriminate Type of Testing (unit, FOT, integration, DT/OT).	N	N	F	N
Outline Software integration testing issues	N	F	P	N
Illustrate sufficient software testing	N	F	P	N
Outline the Test and Evaluation Master Plan relationship to Testing	N	F	F	N
Illustrate High Integrity Systems	N	F	P	N
Illustrate the identification of Testing Risks	N	F	F	N
Evaluate whether a software testing program adequately supports the quality, mission effectiveness and mission suitability goals of an information intensive acquisition program throughout its life cycle of an information intensive program.	N	N	F	N
Evaluate methodologies for analyzing, determining, refining, implementing, and testing software intensive system requirements.	N	N	F	N
Explain the role of testing and evaluation as a feedback mechanism and management tool for the engineering and development of software-intensive systems.	N	N	F	N
Software Acquisition Management Planning & Status Documentation analysis				

Differentiate Software Requirement management from other SW acquisition management practices	N	N	F	N
Outline Requirement Management guidance	N	N	F	N
Differentiate Requirement Management responsibilities	N	N	F	N
Illustrate User involvement	N	N	F	N
Outline Requirement Planning issues	N	N	F	N
Differentiate the types of requirements (derived, explicit, decomposed)	N	F	N	N
Outline Software requirement definition, benefits, and risks of prototyping	N	N	F	N
Discriminate Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	N	N	F	N
Outline Requirements/COTS issues	N	N	F	N
Analyze critical measures of effectiveness for operational issues and criteria	N	N	F	N
Based on high-level project requirements, create and execute a software management plan to track and control a software-intensive program.	N	N	F	N
Analyze the requirements process and its impact on the acquisition process, especially in regards to Initial Capabilities Document (ICD), Capabilities Development Document (CDD), Capabilities Production Document (CPD), Acquisition Program Baseline (APB), and related documents (e.g., Command, Control, Communications, computers and Intelligence (C4I), analysis of Alternatives (AOA), etc.).	N	N	F	N
Evaluate methodologies for analyzing, determining, refining, implementing, and testing software intensive system requirements.	N	N	F	N
Outline the Government management of reviews and audit process	N	N	F	N
Illustrate high interest Software issues and their indicators	N	N	F	N
Outline Critical Software life cycle reviews	N	N	F	N
Outline key Software review questions and data	N	N	F	N
Analyze Entrance & Exit Criteria	N	N	F	N
Outline Software review relationship to system reviews	N	F	N	N
Present and defend capstone software acquisition case analysis.	N	N	F	N
Assess Federal and DoD acquisition initiatives	N	N	F	N
Originate tailored, value added, program documentation (e.g. Acquisition Program Baseline, Risk Management Plan, cost estimates, test results, etc.).	N	N	F	N
Design a method to ensure that measurement data that has been collected in the assessment process is used in the review and decision making processes.	N	N	F	N
Software Economic Factors analysis				
Differentiate methods and models used for SW cost & schedule estimation based on their strengths and weaknesses	F	N	P	N
Outline SW cost & schedule reporting	N	N	F	N
Illustrate Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	F	N	P	N
Outline Life Cycle Costs (incl PDSS)	N	N	F	N
Evaluate strengths and weaknesses of software cost estimation methods and models.	N	N	F	N
Evaluate the philosophy, practice, and processes and merits of for determining, refining, and implementing cost as an independent variable (CAIV) and earned value (EV) in managing software intensive systems.	N	N	F	N
Evaluate, select and apply government and commercial decision tools and evaluation systems used for estimating, measuring, and predicting software cost, schedule and quality as well as in making go/no go decisions.	F	N	F	N
Describe the ways in which benchmarks may be used to forecast performance of your [software-intensive project/program].	F	N	F	N
Estimate the risk reserve required for a software intensive system.	F	N	F	N
Outline Business Process Reengineering (BPR)	N	N	N	F
Illustrate Adapting maturing technologies	N	N	N	F
Outline Development Information System/Enterprise	N	N	N	F
Outline FPI Guidance, Process, Tools	N	N	N	F
Illustrate Model Relationship	N	N	N	F
Describe the linkage of technical reviews to technical program management.	N	F	N	N
Evaluate the impact of selected technologies on the acquisition and development of software-intensive systems.	N	N	F	N
Assess the revised business orientation reflected in the new DoD acquisition policy.	N	N	F	N
Examine differences between commercial software acquisition efforts and DoD efforts.	N	N	F	N
Recognize and selectively adopt commercial best practices.	N	N	F	N

E-2 SPRDE-SE Gap Analysis

SPRDE - SE																				
		Level I						Level II									Level III			
		DAWIA		Additional				DAWIA			Additional						DAWIA		Additional	
SMRT Key Competency Area	SMRT Sub-competencies	ACQ 101 Fundamentals of System Acquisition	SYS 101 Fundamentals of SPRDE	AFIT/SYS 130: CMMI OR NAVAIR CMMI	SAM 101 or IRM 101 Basic SW Acquisition Management OR Basic Information Systems Acquisition	CLM 022 Introduction to Interoperability	AFIT/CSE 481 Intro to Software Engineering	ACQ 201 A&B Intermediate Systems Acquisition, Parts A&B	SYS 202 Intermediate SPRDE, Part I and II	CLE 003 Technical Reviews	SAM 201 Intermediate Software Acquisition Management	BCF 208 Software Cost Estimating	SEI/Introduction to CMMI	AFIT/SYS 165 Intro to Risk Management	CLE 020 Enterprise Architecture	CLM 029 Net-Ready Key Performance Parameter	SYS 302 Technical Leadership in System Engineering	CLL 008 Designing for Supportability in DoD Systems	SAM 301: Intermediate Software Acquisition Management	IRM 201 Intermediate Information Systems Acquisition
Acquisition Strategies																				
	Best system strategies for SW intensive systems	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	Affect of current system Strategies on SW Acquisition Mgmt	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	Strengths and weaknesses of current strategies	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	Impact of acquisition strategy on SW project planning and SW Engineering methods	N	N	N	F	N	N	P	N	N	F	N	N	N	N	N	N	N	F	F
	Impact of Acquisition Reform	N	N	N	F	N	N	F	N	N	F	N	N	N	N	N	N	N	F	F
Architecture										N										
	Software Architecture Fundamentals	N	P	N	F	P	N	N	N	N	F	N	N	N	F	P	N	P	F	F
	Relationship of SW to System Architecture	N	F	N	F	P	N	N	N	N	F	N	N	N	F	P	N	P	F	F
	Relationship of Architecture to SW Design	N	P	N	F	P	N	N	N	N	F	N	N	N	F	P	N	P	F	F
	Impact of architecture on interoperability and reuse	N	P	N	F	F	N	N	N	N	F	N	N	N	F	F	N	P	F	F

	Differences in C3I, MCCR, and AIS systems	N	P	N	F	P	N	N	N	N	F	N	N	N	F	P	N	P	F	F
	Evaluating and Acquiring target environments	N	P	N	F	P	N	N	N	N	F	N	N	N	F	P	N	P	F	F
	Product line & domain engineering considerations (tradeoffs & analysis)	N	P	N	F	P	N	N	N	N	F	N	N	N	F	P	N	P	F	F
Contracting Issues																				
	Development of SW Development Plan (SDP)	N	N	N	F	N	P	N	N	N	N	N	N	N	N	N	N	N	F	N
	Use of SDP in proposal evaluation	N	N	N	F	N	P	N	N	N	N	N	N	N	N	N	N	N	F	N
	Work Break-down Structure (WBS) for SW	F	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	F	N
	Laws/regulation related to SOW and RFP	N	N	N	F	N	N	N	N	N	P	N	N	N	N	N	N	N	F	P
	Quality Issues	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	Contract types and their strengths and weaknesses (for all types of systems)	F	N	N	P	N	N	P	N	N	P	N	N	N	N	N	N	N	F	P
	Deliverables (issues and tradeoffs)	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	SW portion of Proposal Evaluation	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	Data and intellectual property rights	N	P	N	P	N	N	N	N	N	P	N	N	N	N	N	N	N	F	P
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	N	F	N	P	P	N	N	F	N	N	N	N	N	P	P	F	N	F	N
	Model SOWs	P	N	N	F	N	N	P	N	N	P	N	N	N	N	N	N	N	F	P
Configuration Management																				
	Standards for Configuration Mgt	N	F	N	N	N	N	N	F	N	F	N	N	N	N	N	F	N	N	F
	Configuration Mgt Planning	P	F	N	P	N	N	P	P	N	F	N	N	N	N	N	P	N	F	F
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	P	P	N	F	N	N	P	F	N	F	N	N	N	N	N	F	N	N	F
	Synchronization of HW and SW baselines	N	F	N	N	N	N	N	F	N	F	N	N	N	N	N	F	N	N	F

	Configuration Management CASE tools	N	F	N	N	N	F	N	F	N	N	N	N	N	N	N	F	N	N	N
	Management of Configuration Risks	N	F	N	N	P	N	N	F	N	F	N	N	N	N	P	F	N	N	F
Software Cost & Schedule Estimation																				
	Strengths and weaknesses of methods and models used for SW cost & schedule estimation	P	N	N	F	N	N	P	N	N	P	F	N	N	N	N	N	N	P	P
	SW cost & schedule reporting	N	N	N	F	N	N	N	N	N	F	F	N	N	N	N	N	N	F	F
	Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	N	N	N	F	N	N	N	N	N	F	F	N	N	N	N	N	N	P	F
	Life Cycle Costs (incl PDSS)	P	N	N	F	N	N	P	N	N	P	F	N	N	N	N	N	N	F	P
Program/Project Office organization & relationships																				
	Staffing	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	P	F
	Organization	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	P	F
	Matrix Support Groups	P	N	N	F	N	N	P	N	N	F	N	N	N	N	N	N	N	P	F
	Resource Management	F	N	N	N	N	N	F	N	N	N	N	N	N	N	N	N	N	P	N
	Project Control	P	N	N	F	N	N	P	N	N	F	N	N	N	N	N	N	N	P	F
	Project Tracking	P	N	N	F	N	N	P	N	N	F	N	N	N	N	N	N	N	P	F
	End User Involvement	N	F	N	N	N	F	N	P	N	N	N	N	N	N	N	P	N	P	N
	IPT's and working groups	P	P	N	F	N	N	P	P	N	F	N	N	N	N	N	P	N	P	F
	Intergroup Coordination	P	P	N	F	N	N	P	P	N	F	N	N	N	N	N	P	N	P	F
	Corrective Actions	N	P	N	F	N	N	N	P	N	F	N	N	N	N	N	P	N	P	F
	Lessons Learned	P	N	N	F	N	N	P	P	N	F	N	N	N	N	N	P	N	P	F
	Management Issues	P	N	N	F	N	N	P	P	N	F	N	N	N	N	N	P	N	P	F
Software developing and acquiring maturity																				
	Roles of assessments/ evaluations	N	N	F	P	N	N	N	P	P	N	N	F	N	N	N	P	N	N	N
	Methods available to assess maturity	N	N	F	N	N	N	N	P	P	N	N	F	N	N	N	P	N	N	N
	Strengths and weaknesses of current methods	N	N	F	P	N	N	N	P	P	N	N	F	N	N	N	P	N	N	N
	Applications of assessments and evaluations	N	N	F	N	N	N	N	P	P	N	N	F	N	N	N	P	N	N	N
	Role of evaluations/ assessments in contracting	N	N	F	N	N	N	N	P	P	N	N	F	N	N	N	P	N	N	N
	Frequency of	N	N	F	N	N	N	N	P	P	N	N	F	N	N	N	P	N	N	N

	evaluations/ assessments																			
	Responsibilities for evaluations/ assessments	N	N	F	N	N	N	N	P	P	N	N	F	N	N	N	P	N	N	N
Engineering Approaches & Methodologies																				
	Current approaches (e.g., Functional, Object-Oriented)	N	N	N	F	P	F	N	F	N	N	N	N	N	P	P	F	F	P	N
	Strengths and weaknesses of design approaches	N	N	N	F	P	F	N	F	N	N	N	N	N	N	P	F	F	P	N
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	N	N	N	F	P	F	N	N	N	N	N	N	P	N	P	N	F	F	N
	Software Design Guidance (laws, regs, Stds)	N	P	N	F	P	F	N	P	N	P	N	N	N	N	P	P	F	F	P
	Technical fundamentals	N	F	N	P	P	F	N	P	N	N	N	N	N	P	P	P	F	F	N
	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	N	F	N	P	N	F	N	F	N	P	N	N	N	N	N	F	F	P	P
	Criteria for Paradigm selection	N	F	N	P	N	F	N	F	N	P	N	N	N	N	N	F	F	P	P
	Risks and benefits of each development	N	F	N	P	P	F	N	P	N	N	N	N	F	N	P	P	F	P	N
	Paradigm selection resource/ management issues	N	F	N	P	N	F	N	F	N	P	N	N	N	N	N	F	F	F	P
Technical Assessments																				
	Business Process Reengineering (BPR)	N	N	F	N	N	N	N	P	F	N	N	P	N	N	N	N	P	N	P
	Adapting maturing technologies	N	N	N	F	N	N	N	P	F	N	N	P	N	N	N	N	P	N	P
	Development Information System/ Enterprise	N	N	N	F	N	N	N	P	F	N	N	P	N	N	N	N	P	N	P
	FPI Guidance, Process, Tools	N	N	F	N	N	N	N	P	F	N	N	P	N	N	N	N	P	N	P
	Model Relationship	N	N	F	N	N	N	N	P	F	N	N	P	N	N	N	N	P	N	P
Interoperability																				
	Interoperability and Data Administration	N	N	N	F	F	N	N	N	N	F	N	N	N	F	F	N	P	F	F

	Issues																			
	Interoperability and data administration guidance (Laws, regulation, and standards)	N	N	N	F	F	N	N	N	N	F	N	N	N	F	F	N	P	F	F
	Relationship of Software/System Architecture and interoperability	N	N	N	F	F	N	N	N	N	F	N	N	N	F	F	N	P	F	F
Independent Verification and Validation (IV&V)																				
	IV&V definition, benefits, and disadvantages	N	F	N	F	N	N	N	F	P	F	N	N	N	N	N	F	N	N	F
	Determine IV&V levels	N	P	N	N	N	N	N	F	P	P	N	N	N	N	N	F	N	N	P
	IV&V guidance	N	P	N	F	N	N	N	F	P	F	N	N	N	N	N	F	N	N	F
	IV&V relationship to risk management and testing	N	F	N	N	N	N	N	F	P	P	N	N	P	N	N	F	N	N	P
	IV&V effect on development schedule	N	P	N	P	N	N	N	F	P	P	N	N	N	N	N	F	N	N	P
Life Cycle Management																				
	Cost Factors identification	N	N	N	F	N	N	N	N	N	P	N	N	N	N	N	N	P	F	P
	Key Software support transition issues	N	N	N	F	P	N	N	N	N	F	N	N	N	P	P	N	F	F	F
	Organic/Outsourcing Post Deployment Software Support	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	F	F	F
	Software Engineering Environment acquisition & use	N	N	N	F	N	N	N	N	N	F	N	N	N	P	N	N	P	F	F
	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	F	N	N	P	N	N	F	N	N	F	N	N	N	N	N	N	F	F	F
	Support Organization Involvement	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	F	F	F
	Continuous process improvement	N	N	F	N	N	F	N	N	N	N	N	N	N	N	N	N	P	N	N
	End User Involvement	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F	P	N
	Corrective Actions Management	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	P	F	F
	Contract Baseline	N	N	N	F	N	N	P	N	N	P	N	N	N	N	N	N	P	F	P
	Relationship with contractor	N	N	N	F	N	N	P	N	N	P	N	N	N	N	N	N	P	F	P
Metrics																				
	Appropriate metrics for	N	N	N	F	N	N	N	N	P	F	N	N	P	N	N	N	N	F	F

	visibility into development process, software product, system progress																			
	Metrics Collection methodologies	N	N	N	P	N	N	N	N	P	P	N	N	N	N	N	N	N	P	P
	Metrics Interpretation	N	N	N	P	N	N	N	N	P	F	N	N	N	N	N	N	N	P	F
	Bench marking practices	N	N	N	F	N	N	N	N	P	F	N	N	N	N	N	N	N	F	F
Open Systems																				
	Open System Migration issues	N	F	N	N	P	N	N	F	N	N	N	N	N	P	P	F	P	N	N
	Open System guidance (Application Portability Profile, regulations, standards)	N	F	N	N	P	N	N	F	N	N	N	N	N	P	P	F	P	N	N
	Open System adaptation effect on acquisition	N	F	N	N	P	N	N	F	N	P	N	N	N	P	P	F	F	N	P
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	N	F	N	N	P	N	N	F	N	N	N	N	N	P	P	F	F	N	N
Software Quality Management																				
	Software quality factors	N	N	N	F	N	N	N	N	P	F	N	N	N	N	N	N	N	F	F
	Software quality guidance	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	N	N	N	F	N	N	N	N	F	F	N	N	N	N	N	N	N	F	F
	Benefits and risks associated with software quality methods	N	N	N	F	N	N	N	N	N	F	N	N	P	N	N	N	N	F	F
	Software Project Management visibility into software quality (metrics and inspections)	N	N	N	F	N	N	N	N	P	F	N	N	N	N	N	N	N	F	F
	Software Product Assessment Techniques	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
	Software Quality Assurance Planning and Techniques	N	N	N	F	N	N	N	N	N	F	N	N	N	N	N	N	N	F	F
Software Requirement																				
	Software Requirement	N	N	N	F	N	F	N	N	N	F	N	N	N	N	N	N	N	F	F

Management	management definition																			
	Requirement Management guidance	N	N	N	F	N	P	P	N	N	F	N	N	N	N	N	N	N	F	F
	Requirement Management responsibilities	N	N	N	F	N	P	N	N	N	F	N	N	N	N	N	N	N	F	F
	User involvement	N	N	N	F	N	P	N	N	N	F	N	N	N	N	N	N	N	F	F
	Requirement Planning issues	N	N	N	F	N	P	N	N	N	F	N	N	P	P	N	N	N	F	F
	Types of requirements (derived, explicit, decomposed)	N	F	N	N	N	F	N	F	N	N	N	N	N	N	N	F	N	N	N
	Software requirement definition, benefits, and risks of prototyping	N	N	N	F	N	F	N	N	N	P	N	N	P	N	N	N	N	F	P
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	N	N	N	F	N	P	N	N	N	F	N	N	N	P	N	N	N	F	F
	Requirements/COTS issues	N	N	N	F	N	P	N	N	N	F	N	N	N	N	N	N	N	F	F
	Critical measures of effectiveness for operational issues and criteria	N	N	N	F	N	F	N	N	N	P	N	N	N	N	N	N	N	F	P
Software Reviews & Audits																				
	Government management of reviews and audit process	N	N	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	F	N
	High interest Software issues and their indicators	N	N	N	F	N	F	N	N	P	P	N	N	N	N	N	N	N	F	P
	Critical Software life cycle reviews	N	N	N	F	N	F	N	N	P	P	N	N	N	N	N	N	N	F	P
	Key Software review questions and data	N	N	N	F	N	F	N	N	P	P	N	N	N	N	N	N	N	F	P
	Entrance & Exit Criteria	N	N	N	F	N	F	N	N	P	P	N	N	N	N	N	N	N	F	P
	Software review relationship to system reviews	N	F	N	N	N	F	N	F	P	N	N	N	N	N	N	F	N	N	N
Software Reuse																				
	Software Architecture/reuse relationship	N	F	N	N	P	F	N	F	N	P	N	N	N	F	P	F	N	P	P
	Risk mitigation through reuse	N	F	N	N	N	F	N	P	N	N	N	N	P	N	N	P	N	F	N

	Reuse guidance	N	F	N	N	N	F	N	P	N	F	N	N	N	N	N	P	N	F	F
	Domain specific reuse paradigm	N	F	N	N	N	F	N	F	N	N	N	N	N	N	N	F	N	P	N
	Existing Reuse repositories	N	F	N	N	N	F	N	F	N	N	N	N	N	N	N	F	N	P	N
	Contracting mechanisms for reuse	N	F	N	N	N	P	N	P	N	P	N	N	N	N	N	P	N	F	P
	Impact of Open Systems on software reuse	N	F	N	N	P	F	N	F	N	N	N	N	N	P	P	F	N	P	N
	COTS/Reuse Issues	N	F	N	N	P	N	N	P	N	F	N	N	N	N	P	P	N	F	F
	Portability, through platform independence	N	F	N	N	P	F	N	F	N	F	N	N	N	P	P	F	P	P	F
Software Acquisition Risk Management																				
	Software Risk Analysis	N	P	N	F	N	N	N	F	N	F	N	N	F	N	N	F	N	N	F
	Software Risk management issues (planning, etc.)	N	P	N	F	N	N	N	F	N	F	N	N	F	N	N	F	N	F	F
	Varying risk profile through life cycle	N	F	N	N	N	N	N	F	N	F	N	N	F	N	N	F	N	N	F
	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	N	F	N	N	N	N	N	F	N	N	N	N	F	N	N	F	N	N	N
	Risk Management guidance	N	N	N	F	N	N	N	F	N	F	N	N	F	N	N	F	N	N	F
	Domain Competent Work Force	N	N	N	F	N	N	N	F	N	F	N	N	F	N	N	F	N	N	F
Software Security																				
	Software security definition	N	P	N	N	N	P	N	P	N	F	N	N	F	N	N	P	P	F	F
	Security Risk Management	N	F	N	N	N	N	N	P	N	F	N	N	F	N	N	P	P	F	F
	Software security guidance (regulations, standards, "orange book")	N	P	N	F	N	N	N	P	N	F	N	N	F	N	N	P	P	F	F
	System Certification	N	P	N	N	N	N	N	P	N	F	N	N	F	N	N	P	F	F	F
	Contemporary security developments	N	P	N	N	N	P	N	P	N	F	N	N	F	N	N	P	P	F	F
Software Testing Issues																				
	Software testing Phases (DT&E, F/OT&E)	P	N	N	P	N	N	P	N	N	F	N	N	N	N	N	N	N	F	F
	Appropriate Testing metrics (software maturity, error density)	P	N	N	P	N	N	P	N	N	F	N	N	N	N	N	N	N	F	F

	Type of Testing (unit, FOT, integration, DT/OT).	P	N	N	P	N	N	P	N	N	F	N	N	N	N	N	N	F	F
	Software integration testing issues	N	F	N	P	N	N	N	F	N	F	N	N	N	N	N	F	P	F
	Sufficient software testing	N	F	N	P	N	N	N	F	N	F	N	N	N	N	N	F	P	F
	Test and Evaluation Master Plan relationship to Testing	F	F	N	P	N	N	F	F	N	N	N	N	N	N	N	F	F	N
	High Integrity Systems	N	F	N	P	N	N	N	F	N	F	N	N	N	N	N	F	P	F
	Identification of Testing Risks	N	F	N	P	N	N	N	F	N	F	N	N	P	N	N	F	F	F
Emerging issues & Technologies																			
	Joint Technical Architecture (JTA)	N	F	N	P	P	F	N	F	N	N	N	N	N	F	P	F	P	N
	Domain & product line engineering	N	F	N	N	P	F	N	F	N	N	N	N	N	P	P	F	P	N
	Software technology state of the art	N	N	N	F	P	F	N	N	N	F	N	N	N	P	P	N	F	F

E-3 T&E Gap Analysis

Test & Evaluation																	
		Level I							Level II								
		DAWIA				Additional			DAWIA			Additional				Additional	
SMRT Key Competency Area	SMRT Sub-competencies	ACQ 101 Fundamentals of System Acquisition	SYS 101 Fundamentals of SPRDE	TST 102 (2008) Fundamentals of Test & Evaluation	CLE 023 Modeling & Simulation for T&E (or CLE 011 prior to 10/1/07	AFIT/SYS 130: CMMI OR NAVAIR CMMI	SAM 101 or IRM 101 Basic SW Acquisition Management OR Basic Information Systems Acquisition	CLM 022 Introduction to Interoperability	ACQ 201 A&B Intermediate Systems Acquisition, Parts A&B	SYS 202 Intermediate SPRDE, Part I and II	TST 203 (2008) Intermediate T&E	SAM 201 Intermediate Software Acquisition Management	AFIT/CSE 481 Intro to Software Engineering	TST 302 (2008) Advanced Test & Evaluation	CLM 029 Net-Ready Key Performance Parameter	SAM 301: Intermediate Software Acquisition Management	SEI//Introduction to CMMI
Acquisition Strategies																	
	Best system strategies for SW intensive systems	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Affect of current system Strategies on SW Acquisition Mgmt	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Strengths and weaknesses of current strategies	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Impact of acquisition strategy on SW project planning and SW Engineering methods	N	N	N	N	N	F	N	P	N	N	F	N	N	N	F	N
	Impact of Acquisition Reform	N	N	N	N	N	F	N	F	N	N	F	N	N	N	F	N
Architecture																	
	Software Architecture Fundamentals	N	P	N	N	N	F	P	N	N	N	F	N	N	P	F	N
	Relationship of SW to System Architecture	N	F	N	N	N	F	P	N	N	N	F	N	N	P	F	N
	Relationship of Architecture to SW Design	N	P	N	N	N	F	P	N	N	N	F	N	N	P	F	N
	Impact of architecture on interoperability and reuse	N	P	N	N	N	F	F	N	N	N	F	N	N	F	F	N
	Differences in C3I, MCCR, and AIS systems	N	P	N	N	N	F	P	N	N	N	F	N	N	P	F	N
	Evaluating and Acquiring target environments	N	P	N	N	N	F	P	N	N	N	F	N	N	P	F	N
	Product line & domain engineering considerations (tradeoffs & analysis)	N	P	N	N	N	F	P	N	N	N	F	N	N	P	F	N
Contracting Issues																	
	Development of SW Development Plan (SDP)	N	N	N	N	N	F	N	N	N	N	N	P	N	N	F	N
	Use of SDP in proposal evaluation	N	N	N	N	N	F	N	N	N	N	N	P	N	N	F	N
	Work Break-down Structure (WBS) for SW	F	N	N	N	N	N	N	N	N	N	N	P	N	N	F	N
	Laws/regulation related to SOW and RFP	N	N	N	N	N	F	N	N	N	N	P	N	N	N	F	N
	Quality Issues	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Contract types and their strengths and	F	N	N	N	N	P	N	P	N	N	P	N	N	N	F	N

	weaknesses (for all types of systems)																
	Deliverables (issues and tradeoffs)	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	SW portion of Proposal Evaluation	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Data and intellectual property rights	N	P	N	N	N	P	N	N	N	N	P	N	N	N	F	N
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	N	F	N	N	N	P	P	N	F	N	N	N	N	P	F	N
	Model SOWs	P	N	N	N	N	F	N	P	N	N	P	N	N	N	F	N
Configuration Management																	
	Standards for Configuration Mgt	N	F	N	N	N	N	N	N	F	N	F	N	N	N	N	N
	Configuration Mgt Planning	P	F	N	N	N	P	N	P	P	N	F	N	N	N	F	N
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	P	P	N	N	N	F	N	P	F	N	F	N	N	N	N	N
	Synchronization of HW and SW baselines	N	F	N	N	N	N	N	N	F	N	F	N	N	N	N	N
	Configuration Management CASE tools	N	F	N	N	N	N	N	N	F	N	N	F	N	N	N	N
	Management of Configuration Risks	N	F	N	N	N	N	P	N	F	N	F	N	N	P	N	N
Software Cost & Schedule Estimation																	
	Strengths and weaknesses of methods and models used for SW cost & schedule estimation	P	N	N	N	N	F	N	P	N	N	P	N	N	N	P	N
	SW cost & schedule reporting	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	N	N	N	N	N	F	N	N	N	N	F	N	N	N	P	N
	Life Cycle Costs (incl PDSS)	P	N	N	N	N	F	N	P	N	N	P	N	N	N	F	N
Program/Project Office organization & relationships																	
	Staffing	N	N	N	N	N	F	N	N	N	N	F	N	N	N	P	N
	Organization	N	N	N	N	N	F	N	N	N	N	F	N	N	N	P	N
	Matrix Support Groups	P	N	N	N	N	F	N	P	N	N	F	N	N	N	P	N
	Resource Management	F	N	N	N	N	N	N	F	N	N	N	N	N	N	P	N
	Project Control	P	N	N	N	N	F	N	P	N	N	F	N	N	N	P	N
	Project Tracking	P	N	N	N	N	F	N	P	N	N	F	N	N	N	P	N
	End User Involvement	N	F	N	N	N	N	N	N	P	N	N	F	N	N	P	N
	IPT's and working groups	P	P	N	N	N	F	N	P	P	N	F	N	N	N	P	N
	Intergroup Coordination	P	P	N	N	N	F	N	P	P	N	F	N	N	N	P	N
	Corrective Actions	N	P	N	N	N	F	N	N	P	N	F	N	N	N	P	N
	Lessons Learned	P	N	N	N	N	F	N	P	P	N	F	N	N	N	P	N
	Management Issues	P	N	N	N	N	F	N	P	P	N	F	N	N	N	P	N
Software developing and acquiring maturity																	
	Roles of assessments/evaluations	N	N	P	N	F	P	N	N	P	P	N	N	N	N	N	F
	Methods available to assess maturity	N	N	P	N	F	N	N	N	P	P	N	N	N	N	N	F
	Strengths and weaknesses of current methods	N	N	P	N	F	P	N	N	P	P	N	N	N	N	N	F
	Applications of assessments and evaluations	N	N	P	N	F	N	N	N	P	P	N	N	N	N	N	F
	Role of evaluations/assessments in contracting	N	N	P	N	F	N	N	N	P	P	N	N	N	N	N	F
	Frequency of evaluations/assessments	N	N	P	N	F	N	N	N	P	P	N	N	N	N	N	F
	Responsibilities for evaluations/assessments	N	N	P	N	F	N	N	N	P	P	N	N	N	N	N	F
Engineering																	

Approaches & Methodologies	Current approaches (e.g., Functional, Object-Oriented)	N	N	N	N	N	F	P	N	F	N	N	F	N	P	P	N
	Strengths and weaknesses of design approaches	N	N	N	N	N	F	P	N	F	N	N	F	N	P	P	N
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	N	N	N	N	N	F	P	N	N	N	N	F	N	P	F	N
	Software Design Guidance (laws, regs, Stds)	N	P	N	N	N	F	P	N	P	N	P	F	N	P	F	N
	Technical fundamentals	N	F	N	N	N	P	P	N	P	N	N	F	N	P	F	N
	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	N	F	N	N	N	P	N	N	F	N	P	F	N	N	P	N
	Criteria for Paradigm selection	N	F	N	N	N	P	N	N	F	N	P	F	N	N	P	N
	Risks and benefits of each development	N	F	N	N	N	P	P	N	P	N	N	F	N	P	P	N
	Paradigm selection resource/management issues	N	F	N	N	N	P	N	N	F	N	P	F	N	N	F	N
Technical Assessments																	
	Business Process Reengineering (BPR)	N	N	N	N	F	N	N	N	P	N	N	N	N	N	N	P
	Adapting maturing technologies	N	N	N	N	N	F	N	N	P	N	N	N	N	N	N	P
	Development Information System/Enterprise	N	N	N	N	N	F	N	N	P	N	N	N	N	N	N	P
	FPI Guidance, Process, Tools	N	N	N	N	F	N	N	N	P	N	N	N	N	N	N	P
	Model Relationship	N	N	N	N	F	N	N	N	P	N	N	N	N	N	N	P
Interoperability																	
	Interoperability and Data Administration Issues	N	N	N	N	N	F	F	N	N	N	F	N	N	F	F	N
	Interoperability and data administration guidance (Laws, regulation, and standards)	N	N	N	N	N	F	F	N	N	N	F	N	N	F	F	N
	Relationship of Software/System Architecture and interoperability	N	N	N	N	N	F	F	N	N	N	F	N	N	F	F	N
Independent Verification and Validation (IV&V)																	
	IV&V definition, benefits, and disadvantages	N	F	F	N	N	F	N	N	F	F	F	N	F	N	N	N
	Determine IV&V levels	N	P	F	N	N	N	N	N	F	F	P	N	F	N	N	N
	IV&V guidance	N	P	F	N	N	F	N	N	F	F	F	N	F	N	N	N
	IV&V relationship to risk management and testing	N	F	F	N	N	N	N	N	F	F	P	N	F	N	N	N
	IV&V effect on development schedule	N	P	F	N	N	P	N	N	F	F	P	N	F	N	N	N
Life Cycle Management																	
	Cost Factors identification	N	N	N	N	N	F	N	N	N	N	P	N	N	N	F	N
	Key Software support transition issues	N	N	N	N	N	F	P	N	N	N	F	N	N	P	F	N
	Organic/Outsourcing Post Deployment Software Support	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Software Engineering Environment acquisition & use	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	F	N	N	N	N	P	N	F	N	N	F	N	N	N	F	N
	Support Organization Involvement	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Continuous process improvement	N	N	N	N	F	N	N	N	N	N	N	F	N	N	N	N
	End User Involvement	N	F	N	N	N	N	N	N	F	N	N	N	N	N	P	N

	Corrective Actions Management	N	N	N	N	N	F	N	N	N	N	F	N	N	N	F	N
	Contract Baseline	N	N	N	N	N	F	N	P	N	N	P	N	N	N	F	N
	Relationship with contractor	N	N	N	N	N	F	N	P	N	N	P	N	N	N	F	N
Metrics																	
	Appropriate metrics for visibility into development process, software product, system progress	N	N	F	N	N	F	N	N	N	F	F	N	F	N	F	N
	Metrics Collection methodologies	N	N	F	N	N	P	N	N	N	F	P	N	F	N	P	N
	Metrics Interpretation	N	N	F	N	N	P	N	N	N	F	F	N	F	N	P	N
	Bench marking practices	N	N	F	N	N	F	N	N	N	F	F	N	F	N	F	N
Open Systems																	
	Open System Migration issues	N	F	N	N	N	N	P	N	F	N	N	N	N	P	N	N
	Open System guidance (Application Portability Profile, regulations, standards)	N	F	N	N	N	N	P	N	F	N	N	N	N	P	N	N
	Open System adaptation effect on acquisition	N	F	N	N	N	N	P	N	F	N	P	N	N	P	N	N
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	N	F	N	N	N	N	P	N	F	N	N	N	N	P	N	N
Software Quality Management																	
	Software quality factors	N	N	P	N	N	F	N	N	N	N	F	N	N	N	F	N
	Software quality guidance	N	N	P	N	N	F	N	N	N	N	F	N	N	N	F	N
	Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	N	N	P	N	N	F	N	N	N	N	F	N	N	N	F	N
	Benefits and risks associated with software quality methods	N	N	P	N	N	F	N	N	N	N	F	N	N	N	F	N
	Software Project Management visibility into software quality (metrics and inspections)	N	N	P	N	N	F	N	N	N	N	F	N	N	N	F	N
	Software Product Assessment Techniques	N	N	P	N	N	F	N	N	N	N	F	N	N	N	F	N
	Software Quality Assurance Planning and Techniques	N	N	P	N	N	F	N	N	N	N	F	N	N	N	F	N
Software Requirement Management																	
	Software Requirement management definition	N	N	N	N	N	F	N	N	N	N	F	F	N	N	F	N
	Requirement Management guidance	N	N	N	N	N	F	N	P	N	N	F	P	N	N	F	N
	Requirement Management responsibilities	N	N	N	N	N	F	N	N	N	N	F	P	N	N	F	N
	User involvement	N	N	N	N	N	F	N	N	N	N	F	P	N	N	F	N
	Requirement Planning issues	N	N	N	N	N	F	N	N	N	N	F	P	N	N	F	N
	Types of requirements (derived, explicit, decomposed)	N	F	N	N	N	N	N	N	F	N	N	F	N	N	N	N
	Software requirement definition, benefits, and risks of prototyping	N	N	N	N	N	F	N	N	N	N	P	F	N	N	F	N
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	N	N	N	N	N	F	N	N	N	N	F	P	N	N	F	N
	Requirements/COTS issues	N	N	N	N	N	F	N	N	N	N	F	P	N	N	F	N
	Critical measures of effectiveness for operational issues and criteria	N	N	N	N	N	F	N	N	N	N	P	F	N	N	F	N
Software																	

Reviews & Audits	Government management of reviews and audit process	N	N	P	N	N	N	N	N	N	N	N	N	N	N	F	N
	High interest Software issues and their indicators	N	N	P	N	N	F	N	N	N	N	P	F	N	N	F	N
	Critical Software life cycle reviews	N	N	P	N	N	F	N	N	N	N	P	F	N	N	F	N
	Key Software review questions and data	N	N	P	N	N	F	N	N	N	N	P	F	N	N	F	N
	Entrance & Exit Criteria	N	N	P	N	N	F	N	N	N	N	P	F	N	N	F	N
	Software review relationship to system reviews	N	F	P	N	N	N	N	N	F	N	N	F	N	N	N	N
Software Reuse																	
	Software Architecture/reuse relationship	N	F	N	N	N	N	P	N	F	N	P	F	N	P	P	N
	Risk mitigation through reuse	N	F	N	N	N	N	N	N	P	N	N	F	N	N	F	N
	Reuse guidance	N	F	N	N	N	N	N	N	P	N	F	F	N	N	F	N
	Domain specific reuse paradigm	N	F	N	N	N	N	N	N	F	N	N	F	N	N	P	N
	Existing Reuse repositories	N	F	N	N	N	N	N	N	F	N	N	F	N	N	P	N
	Contracting mechanisms for reuse	N	F	N	N	N	N	N	N	P	N	P	P	N	N	F	N
	Impact of Open Systems on software reuse	N	F	N	N	N	N	P	N	F	N	N	F	N	P	P	N
	COTS/Reuse Issues	N	F	N	N	N	N	P	N	P	N	F	N	N	P	F	N
	Portability, through platform independence	N	F	N	N	N	N	P	N	F	N	F	F	N	P	P	N
Software Acquisition Risk Management																	
	Software Risk Analysis	N	P	P	P	N	F	N	N	F	P	F	N	P	N	N	N
	Software Risk management issues (planning, etc.)	N	P	N	N	N	F	N	N	F	N	F	N	N	N	F	N
	Varying risk profile through life cycle	N	F	N	N	N	N	N	N	F	N	F	N	N	N	N	N
	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	N	F	N	N	N	N	N	N	F	N	N	N	N	N	N	N
	Risk Management guidance	N	N	N	N	N	F	N	N	F	N	F	N	N	N	N	N
	Domain Competent Work Force	N	N	N	N	N	F	N	N	F	N	F	N	N	N	N	N
Software Security																	
	Software security definition	N	P	N	N	N	N	N	N	P	N	F	P	N	N	F	N
	Security Risk Management	N	F	N	N	N	N	N	N	P	N	F	N	N	N	F	N
	Software security guidance (regulations, standards, "orange book")	N	P	N	N	N	F	N	N	P	N	F	N	N	N	F	N
	System Certification	N	P	N	N	N	N	N	N	P	N	F	N	N	N	F	N
	Contemporary security developments	N	P	N	N	N	N	N	N	P	N	F	P	N	N	F	N
Software testing Issues																	
	Software testing Phases (DT&E, F/OT&E)	P	N	F	P	N	P	N	P	N	F	F	N	F	N	F	N
	Appropriate Testing metrics (software maturity, error density)	P	N	F	P	N	P	N	P	N	F	F	N	F	N	F	N
	Type of Testing (unit, FOT, integration, DT/OT).	P	N	F	P	N	P	N	P	N	F	F	N	F	N	F	N
	Software integration testing issues	N	F	F	P	N	P	N	N	F	F	F	N	F	N	P	N
	Sufficient software testing	N	F	F	P	N	P	N	N	F	F	F	N	F	N	P	N
	Test and Evaluation Master Plan relationship to Testing	F	F	F	P	N	P	N	F	F	F	N	N	F	N	F	N
	High Integrity Systems	N	F	F	P	N	P	N	N	F	F	F	N	F	N	P	N
	Identification of Testing Risks	N	F	F	P	N	P	N	N	F	F	F	N	F	N	F	N

Emerging issues & Technologies																	
	Joint Technical Architecture (JTA)	N	F	N	N	N	P	P	N	F	N	N	F	N	P	P	N
	Domain & product line engineering	N	F	N	N	N	N	P	N	F	N	N	F	N	P	P	N
	Software technology state of the art	N	N	N	P	N	F	P	N	N	N	F	F	N	P	F	N

E-4 Acquisition Logistics Gap Analysis

Acquisition Logistics																							
		Level I								Level II									Level III				
		DAWIA					Additional			DAWIA									DAWIA	Additional			
SMRT Key Competency Area	SMRT Sub-competencies	ACQ 101 Fundamentals of System Acquisition	LOG 101 Acquisition Logistics Fundamentals	LOG 102 Systems Sustainment Management Fundamentals	CLL 008 Designing for Supportability in DoD Systems	CLL 011 Performance Based Logistics	AFIT/SYS 130: CMMI OR NAVAIR CMMI	SYS 101 Fundamentals of SPRDE	TST 102 (2008) Fundamentals of Test & Evaluation	ACQ 201 A&B Intermediate Systems Acquisition, Parts A&B	LOG 201 A&B Intermediate Acquisition Logistics, Parts A&B	LOG 235 A&B Performance Based Logistics, Parts A&B	SAM 101 or IRM 101 Basic SW Acquisition Management OR Basic Information Systems Acquisition	BCF 208 Software Cost Estimating	AFIT/CSE 481 Intro to Software Engineering	LOG 203 Reliability & Maintainability	LOG 204 Configuration Management	SYS 202 Intermediate SPRDE, Part I and II	LOG 304 Advanced Life Cycle Logistics	SAM 201 Intermediate Software Acquisition Management	SYS 202 Intermediate SPRDE, Part I and II	TST 203 (2008) Intermediate T&E
Acquisition Strategies																							
	Best system strategies for SW intensive systems	N	N	P	N	N	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	
	Affect of current system Strategies on SW Acquisition Mgmt	N	N	P	N	N	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	
	Strengths and weaknesses of current strategies	N	N	P	N	N	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	
	Impact of acquisition strategy on SW project planning and SW Engineering methods	N	N	P	N	N	N	N	N	P	N	N	F	N	N	N	N	N	N	F	N	N	

	Impact of Acquisition Reform	N	N	P	N	N	N	N	N	F	N	N	F	N	N	N	N	N	N	F	N	N
Architecture																						
	Software Architecture Fundamentals	N	N	N	P	N	N	P	N	N	N	N	F	N	N	N	N	N	N	F	N	N
	Relationship of SW to System Architecture	N	N	N	P	N	N	F	N	N	N	N	F	N	N	N	N	N	N	F	N	N
	Relationship of Architecture to SW Design	N	N	N	P	N	N	P	N	N	N	N	F	N	N	N	N	N	N	F	N	N
	Impact of architecture on interoperability and reuse	N	N	N	P	N	N	P	N	N	N	N	F	N	N	N	N	N	N	F	N	N
	Differences in C3I, MCCR, and AIS systems	N	N	N	P	N	N	P	N	N	N	N	F	N	N	N	N	N	N	F	N	N
	Evaluating and Acquiring target environments	N	N	N	P	N	N	P	N	N	N	N	F	N	N	N	N	N	N	F	N	N
	Product line & domain engineering considerations (tradeoffs & analysis)	N	N	N	P	N	N	P	N	N	N	N	F	N	N	N	N	N	N	F	N	N
Contracting Issues																						
	Development of SW Development Plan (SDP)	N	N	N	N	P	N	N	N	N	N	P	F	N	P	N	N	N	N	N	N	N
	Use of SDP in proposal evaluation	N	N	N	N	P	N	N	N	N	N	P	F	N	P	N	N	N	N	N	N	N
	Work Break-down Structure (WBS) for SW	F	N	N	N	P	N	N	N	N	N	P	N	N	P	N	N	N	N	N	N	N
	Laws/regulation related to SOW and RFP	N	N	N	N	P	N	N	N	N	N	P	F	N	N	N	N	N	N	P	N	N

	Quality Issues	N	N	N	N	P	N	N	N	N	N	P	F	N	N	N	N	N	N	F	N	N
	Contract types and their strengths and weaknesses (for all types of systems)	F	N	N	N	P	N	N	N	P	N	P	P	N	N	N	N	N	N	P	N	N
	Deliverables (issues and tradeoffs)	N	N	N	N	P	N	N	N	N	N	P	F	N	N	N	N	N	N	F	N	N
	SW portion of Proposal Evaluation	N	N	N	N	P	N	N	N	N	N	P	F	N	N	N	N	N	N	F	N	N
	Data and intellectual property rights	N	N	N	N	P	N	P	N	N	N	P	P	N	N	N	N	N	N	P	N	N
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	N	N	N	N	P	N	F	N	N	N	P	P	N	N	N	N	F	N	N	F	N
	Model SOWs	P	N	N	N	P	N	N	N	P	N	P	F	N	N	N	N	N	N	P	N	N
Configuration Management																						
	Standards for Configuration Mgt	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	F	F	N	F	F	N
	Configuration Mgt Planning	P	N	N	N	N	N	F	N	P	N	N	P	N	N	N	F	P	N	F	P	N
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	P	N	N	N	N	N	P	N	P	N	N	F	N	N	N	P	F	N	F	F	N
	Synchronization of HW and SW baselines	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	P	F	N	F	F	N
	Configuration Management CASE tools	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	F	F	N	N	F	N

	Management of Configuration	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	F	F	N	F	F	N
Software Cost & Schedule Estimation																						
	Strengths and weaknesses of methods and models used for SW cost & schedule	P	N	N	N	N	N	N	N	P	N	N	F	F	N	N	N	N	N	P	N	N
	SW cost & schedule reporting	N	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	F	N	N
	Validation/assessment of fidelity of cost and schedule	N	N	N	N	N	N	N	N	N	N	N	F	F	N	N	N	N	N	F	N	N
	Life Cycle Costs (incl PDSS)	P	N	N	N	P	N	N	N	P	N	P	F	F	N	N	N	N	N	P	N	N
Program/ Project Office organization & relationships																						
	Staffing	N	P	P	N	N	N	N	N	N	P	N	F	N	N	P	P	N	P	F	N	N
	Organization	N	P	P	N	N	N	N	N	N	P	N	F	N	N	P	P	N	P	F	N	N
	Matrix Support Groups	P	P	P	N	N	N	N	N	P	P	N	F	N	N	P	P	N	P	F	N	N
	Resource Management	F	P	F	N	N	N	N	N	F	P	N	N	N	N	P	P	N	P	N	N	N
	Project Control	P	N	F	N	N	N	N	N	P	N	N	F	N	N	N	N	N	N	F	N	N
	Project Tracking	P	N	F	N	N	N	N	N	P	N	N	F	N	N	N	N	N	N	F	N	N
	End User Involvement	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	P	N	N	P	N
	IPT's and working groups	P	N	P	N	N	N	P	N	P	N	N	F	N	N	N	N	P	N	F	P	N
	Intergroup Coordination	P	P	N	N	N	N	P	N	P	P	N	F	N	N	P	P	P	P	F	P	N
	Corrective Actions	N	N	N	N	N	N	P	N	N	N	N	F	N	N	N	N	P	N	F	P	N
	Lessons Learned	P	P	N	N	P	N	N	N	P	P	P	F	N	N	P	P	P	P	F	P	N
	Management Issues	P	P	P	N	N	N	N	N	P	P	N	F	N	N	P	P	P	P	F	P	N
Software developing and acquiring maturity																						
	Roles of assessments/ evaluations	N	N	N	N	N	F	N	P	N	N	N	P	N	N	N	N	P	N	N	N	P

	Methods available to assess maturity	N	N	N	N	N	F	N	P	N	N	N	N	N	N	N	N	P	N	N	N	P
	Strengths and weaknesses of current methods	N	N	N	N	N	F	N	P	N	N	N	P	N	N	N	N	P	N	N	N	P
	Applications of assessments and evaluations	N	N	N	N	N	F	N	P	N	N	N	N	N	N	N	N	P	N	N	N	P
	Role of evaluations /assessments in contracting	N	N	N	N	N	F	N	P	N	N	N	N	N	N	N	N	P	N	N	N	P
	Frequency of evaluations/ assessments	N	N	N	N	N	F	N	P	N	N	N	N	N	N	N	N	P	N	N	N	P
	Responsibilities for evaluations/ assessments	N	N	N	N	N	F	N	P	N	N	N	N	N	N	N	N	P	N	N	N	P
Engineering Approaches & Method-ologies																						
	Current approaches (e.g., Functional, Object-Oriented)	N	N	N	F	N	N	N	N	N	N	N	F	N	F	N	N	F	N	N	F	N
	Strengths and weaknesses of design approaches	N	N	N	F	N	N	N	N	N	N	N	F	N	F	N	N	F	N	N	F	N
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	N	N	N	F	N	N	N	N	N	N	N	F	N	F	N	N	N	N	N	N	N
	Software Design Guidance (laws, regs, Stds)	N	N	N	F	N	N	P	N	N	N	N	F	N	F	N	N	P	N	P	P	N
	Technical fundamentals	N	N	N	F	N	N	F	N	N	N	N	P	N	F	N	N	P	N	N	P	N

	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	N	N	N	F	N	N	F	N	N	N	N	P	N	F	N	N	F	N	P	F	N
	Criteria for Paradigm selection	N	N	N	F	N	N	F	N	N	N	N	P	N	F	N	N	F	N	P	F	N
	Risks and benefits of each development	N	N	N	F	N	N	F	N	N	N	N	P	N	F	N	N	P	N	N	P	N
	Paradigm selection resource/management issues	N	N	N	F	N	N	F	N	N	N	N	P	N	F	N	N	F	N	P	F	N
Technical Assessments																						
	Business Process Reengineering (BPR)	N	N	N	P	N	F	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N
	Adapting maturing technologies	N	N	N	P	N	N	N	N	N	N	N	F	N	N	N	N	P	N	N	N	N
	Development Information System/ Enterprise	N	N	N	P	N	N	N	N	N	N	N	F	N	N	N	N	P	N	N	N	N
	FPI Guidance, Process, Tools	N	N	N	P	N	F	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N
	Model Relationship	N	N	N	P	N	F	N	N	N	N	N	N	N	N	N	N	P	N	N	N	N
Inter-operability																						
	Interoperability and Data Administration Issues	N	N	N	P	N	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N

	Interoperability and data administration guidance (Laws, regulation, and standards)	N	N	N	P	N	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N
	Relationship of Software/System Architecture and interoperability	N	N	N	P	N	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N
Independent Verification and Validation (IV&V)																						
	IV&V definition, benefits, and disadvantages	N	N	N	N	N	N	F	F	N	N	N	F	N	N	N	N	F	N	F	F	F
	Determine IV&V levels	N	N	N	N	N	N	P	F	N	N	N	N	N	N	N	N	F	N	P	F	F
	IV&V guidance	N	N	N	N	N	N	P	F	N	N	N	F	N	N	N	N	F	N	F	F	F
	IV&V relationship to risk	N	N	N	N	N	N	F	F	N	N	N	N	N	N	N	N	F	N	P	F	F
	IV&V effect on development schedule	N	N	N	N	N	N	P	F	N	N	N	P	N	N	N	N	F	N	P	F	F
Life Cycle Management																						
	Cost Factors identification	N	P	P	P	P	N	N	N	N	P	P	F	N	N	P	P	N	P	P	N	N
	Key Software support transition issues	N	P	P	F	P	N	N	N	N	P	P	F	N	N	P	P	N	P	F	N	N
	Organic/ Outsourcing Post Deployment Software Support	N	P	P	F	P	N	N	N	N	P	P	F	N	N	P	P	N	P	F	N	N
	Software Engineering Environment acquisition & use	N	P	P	P	P	N	N	N	N	P	P	F	N	N	P	P	N	P	F	N	N

	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	F	F	F	F	F	N	N	N	F	F	F	P	N	N	F	F	N	F	F	N	N
	Support Organization Involvement	N	F	F	F	F	N	N	N	N	F	F	F	N	N	F	F	N	F	F	N	N
	Continuous process improvement	N	P	P	P	P	F	N	N	N	P	P	N	N	F	P	P	N	P	N	N	N
	End User Involvement	N	P	P	F	P	N	F	N	N	P	P	N	N	N	P	P	F	P	N	F	N
	Corrective Actions Management	N	P	P	P	P	N	N	N	N	P	P	F	N	N	P	P	N	P	F	N	N
	Contract Baseline	N	F	F	P	F	N	N	N	P	F	F	F	N	N	F	F	N	F	P	N	N
	Relationship with contractor	N	F	F	P	F	N	N	N	P	F	F	F	N	N	F	F	N	F	P	N	N
Metrics																						
	Appropriate metrics for visibility into development process, software product, system progress	N	N	N	N	N	N	N	F	N	N	N	F	N	N	N	N	N	N	F	N	F
	Metrics Collection methodologies	N	N	N	N	N	N	N	F	N	N	N	P	N	N	N	N	N	N	P	N	F
	Metrics Interpretation	N	N	N	N	N	N	N	F	N	N	N	P	N	N	N	N	N	N	F	N	F
	Bench marking practices	N	N	N	N	P	N	N	F	N	N	P	F	N	N	N	N	N	N	F	N	F
Open Systems																						
	Open System Migration issues	N	N	N	P	N	N	F	N	N	N	N	N	N	N	N	N	F	N	N	F	N
	Open System guidance (Application Portability Profile, regulations, standards)	N	N	N	P	N	N	F	N	N	N	N	N	N	N	N	N	F	N	N	F	N

	Open System adaptation effect on acquisition	N	N	N	F	N	N	F	N	N	N	N	N	N	N	N	N	F	N	P	F	N
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	N	N	N	F	N	N	F	N	N	N	N	N	N	N	N	N	F	N	N	F	N
Software Quality Management																						
	Software quality factors	N	N	N	N	N	N	N	P	N	N	N	F	N	N	N	N	N	N	F	N	N
	Software quality guidance	N	N	N	N	N	N	N	P	N	N	N	F	N	N	N	N	N	N	F	N	N
	Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	N	N	N	N	N	N	N	P	N	N	N	F	N	N	N	N	N	N	F	N	N
	Benefits and risks associated with software quality methods	N	N	N	N	N	N	N	P	N	N	N	F	N	N	N	N	N	N	F	N	N
	Software Project Management visibility into software quality (metrics and inspections)	N	N	N	N	N	N	N	P	N	N	N	F	N	N	N	N	N	N	F	N	N
	Software Product Assessment Techniques	N	N	N	N	N	N	N	P	N	N	N	F	N	N	N	N	N	N	F	N	N
	Software Quality Assurance	N	N	N	N	N	N	N	P	N	N	N	F	N	N	N	N	N	N	F	N	N
Software Requirement Management																						
	Software Requirement	N	N	N	N	N	N	P	N	N	N	N	F	N	F	N	N	N	N	F	N	N
	Requirement Management guidance	N	N	N	N	N	N	P	N	P	N	N	F	N	P	N	N	N	N	F	N	N

	Requirement Management responsibilities	N	N	N	N	N	N	P	N	N	N	N	F	N	P	N	N	N	N	F	N	N
	User involvement	N	N	N	N	N	N	P	N	N	N	N	F	N	P	N	N	N	N	F	N	N
	Requirement Planning issues	N	N	N	N	N	N	P	N	N	N	N	F	N	P	N	N	N	N	F	N	N
	Types of requirements (derived, explicit, decomposed)	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	F	N	N	F	N
	Software requirement definition, benefits, and risks of prototyping	N	N	N	N	N	N	P	N	N	N	N	F	N	F	N	N	N	N	P	N	N
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	N	N	N	N	N	N	P	N	N	N	N	F	N	P	N	N	N	N	F	N	N
	Requirements/COTS issues	N	N	N	N	N	N	P	N	N	N	N	F	N	P	N	N	N	N	F	N	N
	Critical measures of effectiveness for operational issues and criteria	N	N	N	N	N	N	P	N	N	N	N	F	N	F	N	N	N	N	P	N	N
Software Reviews & Audits																						
	Government management of reviews and audit process	N	N	N	N	N	N	N	P	N	N	N	N	N	N	N	N	N	N	N	N	N
	High interest Software issues and their indicators	N	N	N	N	N	N	N	P	N	N	N	F	N	F	N	N	N	N	P	N	N

	Critical Software life cycle reviews	N	N	N	N	N	N	N	P	N	N	N	F	N	F	N	N	N	N	P	N	N
	Key Software review questions and data	N	N	N	N	N	N	N	P	N	N	N	F	N	F	N	N	N	N	P	N	N
	Entrance & Exit Criteria	N	N	N	N	N	N	N	P	N	N	N	F	N	F	N	N	N	N	P	N	N
	Software review relationship to	N	N	N	N	N	N	F	P	N	N	N	N	N	F	N	N	F	N	N	F	N
Software Reuse																						
	Software Architecture/reus	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	F	N	P	F	N
	Risk mitigation through reuse	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	P	N	N	P	N
	Reuse guidance	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	P	N	F	P	N
	Domain specific reuse paradigm	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	F	N	N	F	N
	Existing Reuse repositories	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	F	N	N	F	N
	Contracting mechanisms for reuse	N	N	N	N	N	N	F	N	N	N	N	N	N	P	N	N	P	N	P	P	N
	Impact of Open Systems on software reuse	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	F	N	N	F	N
	COTS/Reuse Issues	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	N	P	N	F	P	N
	Portability, through platform independence	N	N	N	P	N	N	F	N	N	N	N	N	N	F	N	N	F	N	F	F	N
Software Acquisition Risk Management																						
	Software Risk Analysis	N	N	N	N	N	N	P	P	N	N	N	F	N	N	N	N	F	N	F	F	P
	Software Risk management issues (planning, etc.)	N	N	N	N	N	N	P	N	N	N	N	F	N	N	N	N	F	N	F	F	N
	Varying risk profile through life cycle	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	N	F	N	F	F	N

	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	N	N	N	N	N	N	F	N	N	N	N	N	N	N	N	N	F	N	N	F	N
	Risk Management guidance	N	N	N	N	N	N	N	N	N	N	N	F	N	N	N	N	F	N	F	F	N
	Domain Competent Work Force	N	N	N	N	N	N	N	N	N	N	N	F	N	N	N	N	F	N	F	F	N
Software Security																						
	Software security definition	N	N	N	P	N	N	P	N	N	N	N	N	N	P	N	N	P	N	F	P	N
	Security Risk Management	N	N	N	P	N	N	F	N	N	N	N	N	N	N	N	N	P	N	F	P	N
	Software security guidance (regulations, standards, "orange book")	N	N	N	P	N	N	P	N	N	N	N	F	N	N	N	N	P	N	F	P	N
	System Certification	N	N	N	F	N	N	P	N	N	N	N	N	N	N	N	N	P	N	F	P	N
	Contemporary security	N	N	N	P	N	N	P	N	N	N	N	N	N	P	N	N	P	N	F	P	N
Software testing Issues																						
	Software testing Phases (DT&E, F/OT&E)	P	N	N	N	N	N	N	F	P	N	N	P	N	N	N	N	N	N	F	N	F
	Appropriate Testing metrics	P	N	N	N	N	N	N	F	P	N	N	P	N	N	N	N	N	N	F	N	F
	Type of Testing (unit, FOT, integration, DT/OT).	P	N	N	N	N	N	N	F	P	N	N	P	N	N	N	N	N	N	F	N	F
	Software integration testing issues	N	N	N	N	N	N	F	F	N	N	N	P	N	N	N	N	F	N	F	F	F

	Sufficient software testing	N	N	N	N	N	N	F	F	N	N	N	P	N	N	N	N	F	N	F	F	F
	Test and Evaluation Master Plan relationship to Testing	F	N	N	N	N	N	F	F	F	N	N	P	N	N	N	N	F	N	N	F	F
	High Integrity Systems	N	N	N	N	N	N	F	F	N	N	N	P	N	N	N	N	F	N	F	F	F
	Identification of Testing Risks	N	N	N	N	N	N	F	F	N	N	N	P	N	N	N	N	F	N	F	F	F
Emerging issues & Technologies																						
	Joint Technical Architecture (JTA)	N	N	N	N	N	N	F	N	N	N	N	P	N	F	N	N	F	N	N	F	N
	Domain & product line engineering	N	N	N	N	N	N	F	N	N	N	N	N	N	F	N	N	F	N	N	F	N
	Software technology state of the art	N	N	N	N	N	N	F	N	N	N	N	F	N	F	N	N	N	N	F	N	N

E-5 Contracts Gap Analysis

Contracts																						
		Level I							Level I									Level II				
		DAWIA						Additional	DAWIA									DAWIA		Additional		
SMRT Key Competency Area	SMRT Sub-competencies	CON 100 Shaping Smart Bus. Arrangements	CON 110 Mission Support Planning	CON 111 Mission Planning Execution	CON 112 Mission Performance Assessment	CON 120 Mission Focused Contracting	CLC 033 Contract Format and Structure for DoD e-business Environment	None Specified	ACQ 101 Fundamentals of System Acquisition	CON 214 Business Decisions for CON	CON 215 Intermediate CON for Mission Support	CON 216 Legal Considerations in CON	CON 217 Cost analysis & Negotiation Technique	CON 218 Advanced CON for Mission Support	SAM 101 or IRM 101 Basic SW Acquisition Management OR Basic Information Systems Acquisition	AFIT/SYS 130: CMMI OR NAVAIR CMMI	BCF 208 Software Cost Estimating	ACQ 201 A&B Intermediate Systems Acquisition, Parts A&B	CON 353 Advanced Business Solutions for Mission Support	SAM 201 Intermediate Software Acquisition Management		
Acquisition Strategies																						
	Best system strategies for SW intensive systems	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	P	F		
	Affect of current system Strategies on SW Acquisition Mgmt	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	P	F		
	Strengths and weaknesses of current strategies	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	P	F		
	Impact of acquisition strategy on SW project planning and SW Engineering methods	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	P	P	F		
	Impact of Acquisition Reform	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	F	P	F		
Architecture																						
	Software Architecture Fundamentals	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F		
	Relationship of SW to System Architecture	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F		

	Relationship of Architecture to SW Design	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Impact of architecture on interoperability and reuse	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Differences in C3I, MCCR, and AIS systems	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Evaluating and Acquiring target environments	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Product line & domain engineering considerations (tradeoffs & analysis)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
Contracting Issues																				
	Development of SW Development Plan (SDP)	P	P	P	P	P	P		N	P	P	P	P	P	F	N	N	N	P	N
	Use of SDP in proposal evaluation	P	P	P	P	P	P		N	P	P	P	P	P	F	N	N	N	P	N
	Work Break-down Structure (WBS) for SW	P	P	P	P	P	P		F	P	P	P	P	P	N	N	N	N	P	N
	Laws/regulation related to SOW and RFP	P	F	P	P	P	P		N	P	P	P	P	P	F	N	N	N	P	P
	Quality Issues	P	P	P	P	P	P		N	P	P	P	P	P	F	N	N	N	P	F
	Contract types and their strengths and weaknesses (for all types of systems)	P	F	F	P	P	P		F	P	P	P	P	P	P	N	N	P	P	P
	Deliverables (issues and tradeoffs)	P	P	P	P	P	P		N	P	P	P	P	P	F	N	N	N	P	F
	SW portion of Proposal Evaluation	P	P	P	P	P	P		N	P	P	P	P	P	F	N	N	N	P	F
	Data and intellectual property rights	P	P	P	P	P	P		N	P	P	P	P	P	P	N	N	N	P	P
	Commercial & DoD best practices such as Joint Technical Architecture (JTA), Open Systems, COTS, Reuse	P	P	P	P	P	P		N	P	P	P	P	P	P	N	N	N	P	N
	Model SOWs	P	P	P	P	P	P		P	P	P	P	P	P	F	N	N	P	P	P

Configuration Management																				
	Standards for Configuration Mgt	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
	Configuration Mgt Planning	N	N	N	N	N	N		P	N	N	N	N	N	P	N	N	P	N	F
	Use of Configuration Mgt throughout SW life-cycle (SMRB, etc.)	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F
	Synchronization of HW and SW baselines	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
	Configuration Management CASE tools	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Management of Configuration Risks	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
Software Cost & Schedule Estimation																				
	Strengths and weaknesses of methods and models used for SW cost & schedule estimation	N	N	P	N	N	N		P	N	N	N	N	N	F	N	F	P	N	P
	SW cost & schedule reporting	N	N	N	N	N	N		N	N	N	N	N	N	F	N	F	N	N	F
	Validation/assessment of fidelity of cost and schedule estimates for SW intensive projects	N	N	N	N	N	N		N	N	N	N	N	N	F	N	F	N	N	F
	Life Cycle Costs (incl PDSS)	N	N	N	N	N	N		P	N	N	N	N	N	F	N	F	P	N	P
Program/ Project Office organization & relationships																				
	Staffing	N	N	P	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Organization	N	N	P	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Matrix Support Groups	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F
	Resource Management	N	N	P	N	N	N		F	N	N	N	N	N	N	N	N	F	N	N
	Project Control	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F
	Project Tracking	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F

	End User Involvement	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	IPT's and working groups	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F
	Intergroup Coordination	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F
	Corrective Actions	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Lessons Learned	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F
	Management Issues	N	N	N	N	N	N		P	N	N	N	N	N	F	N	N	P	N	F
Software developing and acquiring maturity																				
	Roles of assessments/ evaluations	N	N	N	N	N	N		N	N	N	N	N	N	P	F	N	N	N	N
	Methods available to assess maturity	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
	Strengths and weaknesses of current methods	N	N	N	N	N	N		N	N	N	N	N	N	P	F	N	N	N	N
	Applications of assessments and evaluations	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
	Role of evaluations/ assessments in contracting	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
	Frequency of evaluations/ assessments	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
	Responsibilities for evaluations/ assessments	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
Engineering Approaches & Methodologies																				
	Current approaches (e.g., Functional, Object-Oriented)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	N
	Strengths and weaknesses of design approaches	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	N
	Effect of design approach on SW engineering, project planning, CASE selection and use, design reviews & docs	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	N

	Software Design Guidance (laws, regs, Stds)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
	Technical fundamentals	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	N
	Development Paradigms (Waterfall, Spiral, Prototyping, Incremental, IE) definitions	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	P
	Criteria for Paradigm selection	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	P
	Risks and benefits of each development	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	N
	Paradigm selection resource/ management issues	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	P
Technical Assessments																				
	Business Process Reengineering (BPR)	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
	Adapting maturing technologies	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	N
	Development Information System/Enterprise	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	N
	FPI Guidance, Process, Tools	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
	Model Relationship	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
Inter-operability																				
	Interoperability and Data Administration Issues	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Interoperability and data administration guidance (Laws, regulation, and standards)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Relationship of Software/System Architecture and interoperability	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
Independent Verification and Validation (IV&V)																				
	IV&V definition, benefits, and disadvantages	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Determine IV&V	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	P

	levels																			
	IV&V guidance	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	IV&V relationship to risk management and testing	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	P
	IV&V effect on development schedule	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	P
Life Cycle Management																				
	Cost Factors identification	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
	Key Software support transition issues	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Organic/Outsourcing Post Deployment Software Support	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Software Engineering Environment acquisition & use	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	DoD Life Cycle Guidance (Directives, Instructions, Standards, etc.)	N	N	N	N	N	N		F	N	N	N	N	N	P	N	N	F	N	F
	Support Organization Involvement	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Continuous process improvement	N	N	N	N	N	N		N	N	N	N	N	N	N	F	N	N	N	N
	End User Involvement	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Corrective Actions Management	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Contract Baseline	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	P	N	P
	Relationship with contractor	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	P	N	P
Metrics																				
	Appropriate metrics for visibility into development process, software product, system progress	N	N	P	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Metrics Collection methodologies	N	N	P	N	N	N		N	N	N	N	N	N	P	N	N	N	N	P
	Metrics Interpretation	N	N	P	N	N	N		N	N	N	N	N	N	P	N	N	N	N	F
	Bench marking practices	N	N	P	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F

Open Systems																				
	Open System Migration issues	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Open System guidance (Application Portability Profile, regulations, standards)	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Open System adaptation effect on acquisition	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	P
	Commercial Off the Shelf/Non-Developmental item (COTS/NDI) issues	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
Software Quality Management																				
	Software quality factors	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Software quality guidance	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Quality improvement methods (Formal Inspection, Walk throughs, Clean room, Peer reviews)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Benefits and risks associated with software quality methods	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Software Project Management visibility into software quality (metrics and inspections)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Software Product Assessment Techniques	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Software Quality Assurance Planning and Techniques	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
Software Requirement Management																				
	Software Requirement management definition	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Requirement Management guidance	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	P	N	F

	Requirement Management responsibilities	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	User involvement	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Requirement Planning issues	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Types of requirements (derived, explicit, decomposed)	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Software requirement definition, benefits, and risks of prototyping	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
	Requirements Management issues (baselines, traceability, tool support, life cycle requirements variance)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Requirements/ COTS issues	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Critical measures of effectiveness for operational issues and criteria	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
Software Reviews & Audits																				
	Government management of reviews and audit process	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	High interest Software issues and their indicators	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
	Critical Software life cycle reviews	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
	Key Software review questions and data	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
	Entrance & Exit Criteria	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	P
	Software review relationship to system reviews	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
Software Reuse																				
	Software Architecture/reuse	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	P

	relationship																			
	Risk mitigation through reuse	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Reuse guidance	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
	Domain specific reuse paradigm	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Existing Reuse repositories	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Contracting mechanisms for reuse	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	P
	Impact of Open Systems on software reuse	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	COTS/ Reuse Issues	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
	Portability, through platform independence	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
Software Acquisition Risk Management																				
	Software Risk Analysis	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Software Risk management issues (planning, etc.)	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Varying risk profile through life cycle	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
	Organizational risk mitigation entities (SEMP, RMWG, TIWG, CRWG, CRLCMP, IPT's, etc.)	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Risk Management guidance	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	Domain Competent Work Force	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
Software Security																				
	Software security definition	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
	Security Risk Management	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
	Software security guidance (regulations, standards, "orange book")	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F
	System Certification	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F

	Contemporary security developments	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	F
Software testing Issues																				
	Software testing Phases (DT&E, F/OT&E)	N	N	N	N	N	N		P	N	N	N	N	N	P	N	N	P	N	F
	Appropriate Testing metrics (software maturity, error density)	N	N	N	N	N	N		P	N	N	N	N	N	P	N	N	P	N	F
	Type of Testing (unit, FOT, integration, DT/OT).	N	N	N	N	N	N		P	N	N	N	N	N	P	N	N	P	N	F
	Software integration testing issues	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	F
	Sufficient software testing	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	F
	Test and Evaluation Master Plan relationship to Testing	N	N	N	N	N	N		F	N	N	N	N	N	P	N	N	F	N	N
	High Integrity Systems	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	F
	Identification of Testing Risks	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	F
Emerging issues & Technologies																				
	Joint Technical Architecture (JTA)	N	N	N	N	N	N		N	N	N	N	N	N	P	N	N	N	N	N
	Domain & product line engineering	N	N	N	N	N	N		N	N	N	N	N	N	N	N	N	N	N	N
	Software technology state of the art	N	N	N	N	N	N		N	N	N	N	N	N	F	N	N	N	N	F

Appendix F: Legal

	FEDPUBSEMINARS Government Contract and Intellectual Property	FEDPUBSEMINARS Licensing Software and Technology to the Federal Government	FEDPUBSEMINARS Rights in Technical Data & Computer Software in Government Contracts
Defining Rights In Intellectual Property Under Government Procurement Contracts			
Principles of Patent law	X	X	
Define Types of Patents	X		
Discuss Bayh-Dole Act and Implementing Executive Orders	X		X
Review Principles of Copyright Law	X	X	
Discuss Exclusive Rights vs. Limitation on Rights	X		
Discuss Copyrights under Government Contracts	X	X	
Principles of Trademark Law	X		
Consideration arising from E-Commerce	X		X
Rights in Technical Data and Computer Software in Government Contracts			
Definitions of technical data and computer software	X	X	
Explain Regulatory Revisions and Frameworks	X		
Explain Unlimited Rights			X
Define Limited Rights in Technical Data	X		X
Define Government Purpose License rights and Government Purpose Rights	X	X	X
Define non-standard rights			
Software Escrow			
Define different types of software agreements	X		X
Software Escrow benefits and concerns for the Government	X		
Software Escrow benefits and concerns for the Developer		X	X
Software Escrow benefits and concerns for the Prime Contractor	X		
Discuss common pitfalls for of SW escrow agreements	X		X
Intellectual Property Rights under CRADA's			
Define CRADA's	X		
Discuss CRADA marketing considerations	X		
Enforcing Intellectual Property Rights Under Government Contracts			
Claims against the Government for Infringement of Misappropriations	X	X	
Discuss March-In Rights	X		
Emerging Intellectual Property Issues			
Relating to Home Land Security	X		
Relating to Open Source Software	X		
Licensing Software and Technology to the Federal Government			
Discuss Issues Regarding Government Buys of Intellectual Property		X	X
Discuss Issues Regarding Government Licenses of Intellectual Property		X	
Discuss Writing Standard License Agreements		X	X
Review Government Purpose & Nonstandard Rights 1988 and 1995 Regulations	X	X	
Discuss SW rights resulting from Experimental Development		X	X
Discuss "Government Purpose Rights"		X	
Discuss Remedies in Bid Protest Cases		X	X
Discuss Remedies for Licensing Problems		X	
Discuss the breach of contract damages	X	X	
Define limited rights in technical data			X
Define restricted rights in computer software			X
Discuss warranties and indemnifications	X		X

Appendix G Software Relevant Learning Activities

G-1 Federal Publication Seminars

Title	**Licensing Software and Technology to the Federal Government**
Description	Addresses Part 227, Rights in Technical Data and Computer Software, of the Department of Defense Federal Acquisition Regulation Supplement (the DFARS) and topics such as: intellectual property issues, data rights, and licensing.
Delivery Mode	Classroom, 2 days
Cost	$995 registration fee
More information	http://www.fedpubseminars.com/seminar/lspg.html

Title	**Government Contracting for Software Development**
Description	Offers guidance on successfully, economically, and profitably managing the entire process of Government contracting for software development. Major topics include: waterfall and other models, CMMI, risk management, special contract clauses, quality control, software protection, deliverables, cost estimating, metrics, source selection, etc.
Delivery Mode	In-House, 2 days
More information	http://www.fedpubseminars.com/seminar/gcsd.html

Title	**Rights in Technical Data & Computer Software**
Description	For Government contract professionals. Covers data rights policies, the Information Technology Management Reform Act (ITMRA), allocation of rights, regulatory revisions, licensing, patent rights, and the Freedom of Information Act.
Delivery Mode	Classroom, 2 days
Cost	$995 registration fee
More information	http://www.fedpubseminars.com/seminar/ritdcs.html

Title	**The Government Contract Intellectual Property Institute**
Description	Covers basic intellectual property assets, commercialization of Government-owned technologies, cooperative agreements, CRADA's and other transactions, and rights in technical data and computer software.
Delivery Mode	Classroom, 2 days
Cost	$995 registration fee
More information	http://www.fedpubseminars.com/seminar/ipinst.html

Title	**Managing IT Contracts**
Description	Covers contracting for information technology in both the Government and commercial sectors. Both contract formation and contract administration is covered with a focus on the special challenges associated with buying information technology, including both commercial and noncommercial hardware, software and services.
Delivery Mode	In-house, 2 days
More information	http://www.fedpubseminars.com/seminar/managitk.html

G-2 American Management Association Seminars

Title	**Government IT Project Management**
Description	Designed to help government employees develop solid IT project management skills currently mandated by most federal and state agencies. Topics include: project management process, leadership, project scope, WBS, work estimates, EVM, etc.
Delivery Mode	Classroom and on-line, 3 days
Cost	$1,895
More information	http://www.amanet.org/seminars/seminar.cfm?basesemno=7515

Title	**Managing Today's IT and Technical Professionals**
Description	Designed to help managers understand what drives or motivates IT professionals, align the IT professional's goals with business goals, analyze performance based on business requirements, making decisions with technical professionals, etc.
Delivery Mode	Classroom and on-line, 3 days
Cost	$1,995
More information	http://www.amanet.org/seminars/seminar.cfm?basesemno=2285

Title	**Information Technology Project Management**
Description	Designed to help managers maintain control of projects, deliver quality systems on time, plan for the unexpected, budget effectively, minimize conflict, and use project management software tools
Delivery Mode	Classroom and on-line, 3 days
Cost	$1,895
More information	http://www.amanet.org/seminars/seminar.cfm?basesemno=6515

G-3 ProTech Training Seminars

Title	**Extreme Programming (XP): Managers Course**
Description	Extreme Programming (XP) is the most popular of a new breed of "light weight" software development methodologies. It is ideally suited for rapid development efforts in which requirements are uncertain or changing. XP is a rapid prototyping, iterative development methodology that emphasizes quality, simplicity, refactoring, collective ownership and continuous integration. This workshop will be an intensive emersion in the practices and artifacts of XP. After this workshop, the student will understand the benefits of XP, and when and how to apply it.
Delivery Mode	Classroom, 2 days
More information	http://www.protechtraining.com/training/curriculum/index.jsp?category=ANALYSIS-AND-DESIGN

Title	**Effective Methods of Software Testing**
Description	This workshop provides comprehensive coverage of the testing processes available to support the development and delivery of quality software. The focus is on integrated testing processes and procedures, which can be made a part of the software development. The course covers the principles, the processes and the documentation of software testing, verification and validation.
Delivery Mode	Classroom, 3 days
More information	http://www.protechtraining.com/training/curriculum/index.jsp?category=ANALYSIS-AND-DESIGN

Title	**Software Quality Assurance**
Description	This course provides immediately usable tools and techniques in the latest methods of software quality assurance (SQA) for accurate and thorough verification and validation of software and improved managerial control of software development and enhancement.
Delivery Mode	Classroom, 3 days
More information	http://www.protechtraining.com/training/curriculum/index.jsp?category=ANALYSIS-AND-DESIGN

Title	**Software Configuration Management**
Description	This course introduces SCM and its importance to organizations that depend upon software as a product It provides immediately usable concepts, definitions, practices, tools and strategies in the latest methods of (SCM) for accurate and thorough baselines, libraries, versions and releases including verification and validation of software.
Delivery Mode	Classroom, 2 days
More information	http://www.protechtraining.com/training/curriculum/index.jsp?category=ANALYSIS-AND-DESIGN

Title	**Just In Time (JIT) Testing**
Description	Just-in-Time (JIT) Testing is a highly interactive three-day workshop that explores the most effective techniques to manage and track software testing in chaotic environments. This seminar focuses on real techniques applied to real projects; the approaches discussed have been applied to many different software projects. Commercial off the shelf (COT) applications can be tested with JIT Testing techniques. Agile, Iterative or Waterfall approaches have all benefited from JIT testing to help get things done.
Delivery Mode	Classroom, 3 days
More information	http://www.protechtraining.com/training/curriculum/index.jsp?category=ANALYSIS-AND-DESIGN

G-4 SEI Events

Title	**Software Engineering Process Group (SEPG) Conference**
Description	Annual conference focuses on improving software systems development and maintenance.
Duration	4 days
More information	http://www.sei.cmu.edu/sepg/2008/

Title	**Team Software Process Symposium**
Description	The TSP Symposium is the event where all of the yearly TSP activities will occur. The purpose of the conference is to bring together the users, adopters, and developers of the TSP, those involved in its development and transition, and those who are new to the technology and eager to learn more. The attendees will have the opportunity to exchange ideas, concepts, and lessons learned concerning the experiences, best practices, and suggested introduction strategy for the TSP methods and practices.
Duration	4 days
Cost	$400-450
More information	http://www.sei.cmu.edu/tsp/symposium.html

Title	**Annual CMMI Technology Conference and User Group**
Description	The purpose of the Conference is to exchange ideas, concepts and lessons learned concerning the continuing evolution, adoption and use of the CMMI and its associated appraisal (assessment and evaluation) methods. This Conference brings together CMMI adopters, users, developers and appraisers, as well as those with general interest in process improvement. It provides a forum for the free exchange of ideas and affords a unique opportunity to meet with the sponsors, developers and stewards of the CMMI, as well as those offering CMMI training and implementation assistance. Emphasis will be placed on CMMI implementation methods and strategies, return on investment and program/project performance benefits
Duration	4 days
More information	http://www.sei.cmu.edu/cmmi/events/cmmi-techconf/

Title	**Working IEEE/IFIP Conference on Software Architecture (WICSA)**
Description	Its purpose is to bring together software engineering practitioners and researchers from industry and academia to exchange experiences, results and ideas related to all aspects of software architecture. Its mission is to strengthen and expand its role as the premier conference on architectural issues in software system design, development and maintenance, practitioners as well as academics
Duration	4 days
Cost	$625-800
More information	http://www.sei.cmu.edu/cmmi/events/cmmi-techconf/

G-5 SEI Training

Title	**Intermediate Concepts of CMMI Version 1.2**
Description	This course has been updated to support Version 1.2 of the CMMI Product Suite. This five-day course introduces candidate SCAMPI Lead Appraisers, candidate CMMI instructors, systems and software engineers, engineering process group (e.g., EPG, SEPG) members, and others to detailed CMMI concepts, including the relationships among CMMI model components. CMMI models are tools that organizations can use to help improve their ability to develop and maintain quality products and services.
Delivery Mode	Classroom, 5 days
Cost	$2,200
More information	http://www.sei.cmu.edu/products/courses/a02b.html

Title	**Defining Software Processes**
Description	This three-and-a-half-day course introduces those involved in process definition in an organization, including process action team (PAT) and/or engineering process group (e.g., EPG, SEPG) members, to processes, methods, and skills for working as a team to understand, model, and document current processes; analyze process deficiencies; and specify needed process improvements. Defining processes is a key step to achieving maturity level 2 of the Software CMM, Software Acquisition CMM, and CMMI as well as to becoming certified for ISO 9000 and 9001. This course emphasizes the basic skills and knowledge required to effectively document and define processes and to design improvements.
Delivery Mode	Classroom, 4 days
Cost	$1,470
More information	http://www.sei.cmu.edu/products/courses/defin.sw.proc.html

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Title	**Mastering Process Improvement**
Description	This five-day course introduces members of a process group (e.g., PG, EPG, SEPG), those leading and facilitating process improvement activities, and those preparing to adopt a CMM® or CMMI® model to guide process improvement in their organization to a series of effective practices for process improvement. These practices address the intertwined challenges faced by change agents in conducting a process improvement effort.
Delivery Mode	Classroom, 5 days
Cost	$2,310
More information	http://www.sei.cmu.edu/products/courses/master-process-improve.html

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Title	**Software Architecture: Principles and Practices**
Description	This course was designed for professionals who design, develop, or manage the construction of software-intensive systems. This course helps practicing software professionals quickly gain insight into the latest concepts of what software architecture is and how to use it successfully. This course is based on the book *Software Architecture in Practice, 2nd Edition*.
Delivery Mode	Classroom, 2 days
Cost	$1,055
More information	http://www.sei.cmu.edu/products/courses/saf.html

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Title	**Documenting Software Architectures**
Description	This two-day course provides in-depth coverage of effective software architecture documentation practices that meet the needs of the entire architecture stakeholder community. This course presents the information in the context of prevailing prescriptive models, including the Rational Unified Process (RUP), the Siemens Four Views software approach, the IEEE 1471-2000 standard, and the Unified Modeling Language (UML). The course is based on the book *Documenting Software Architectures: Views and Beyond*.
Delivery Mode	Classroom, 2 days
Cost	$1,055
More information	http://www.sei.cmu.edu/products/courses/dsa.html

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Title	**Software Product Lines**
Description	This two-day course introduces the world of software product lines and the basic concepts behind it. The course also provides an overview of the essential technical and management practices needed to succeed with software product lines, and guidelines and patterns for applying product line techniques. Case studies illustrate the concepts. This course, which is also included in the SEI Software Architecture Curriculum, is based on the book *Software Product Lines: Practices and Patterns*. The goal of this course is for participants to understand the fundamental concepts and practices involved in software product lines
Delivery Mode	Classroom, 2 days
Cost	$1,055
More information	http://www.sei.cmu.edu/products/courses/spl.html

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Title	**COTS-Based Systems for Program Managers**
Description	This one-day course addresses the major challenges and opportunities associated with the use of commercial off-the-shelf (COTS) products in software-intensive systems from the perspective of the program manager.
Delivery Mode	Classroom, 1 days
Cost	$400
More information	http://www.sei.cmu.edu/products/courses/cots-progmgrs.html

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Title	**Software Acquisition Survival Skills**
Description	This three-day course is designed for program managers and their staff members. It presents an integrated, unique acquisition perspective on key topics in software system acquisition, including risk management, requirements management, pre-award activities, systems engineering, software architecture, technical evaluation, project metrics, and process management. The course provides a broad overview of the skills needed in a program office to manage software acquisition, enabling program managers to recognize the needs of their programs in relation to the skills of their staff.
Delivery Mode	Classroom, 3 days
Cost	$1,260
More information	http://www.sei.cmu.edu/products/courses/sass.html

G-6 DoD Conferences & Forums

Title	**DoD Modeling and Simulation (M&S) Conference**
Description	Brings together leaders to formulate and communicate a common view of how best to use the power of M&S to enhance support to warfighters. Topics include M&S tools, architecture, development, interoperability, data, VV&A, and other acquisition topics.
Duration	5 days
More information	https://www.dmso.mil/public/

Title	**DoD Systems Engineering Forum**
Description	Meets monthly. Purpose is to develop and communicate collaborative solutions, and to monitor SE revitalization and implementation.
Duration	5 days
More information	https://www.dmso.mil/public/

Title	**PEO/SYSCOM Commanders' Conference**
Description	Sponsored by DPAP, this annual conference brings together hundreds of senior leaders in the DOD AT&L community and their industry counterparts to discuss former and current initiatives critical to the accomplishment of the AT&L mission.
Duration	3 days
More information	http://www.acq.osd.mil/dpap/index.html

Title	**DoD Maintenance Symposium & Exhibition**
Description	Explores the latest developments in DoD weapon systems and equipment maintenance, including military and commercial maintenance technologies, information systems, and management processes. This symposium brings together government and industry representatives to exchange ideas for improving maintenance practices and procedures.
Duration	4 days
More information	http://www.sae.org/events/dod/

G-6 NDIA Conferences & Courses

Title	**Precision Strike Technology Symposium**
Description	Conducted at the SECRET/NOFORN level. Offers the opportunity to present to one's peers the latest advances and cutting edge research and thinking in areas of strike weapons, desired weapons effects, targeting, and required C4ISR.
Duration	3 days
Cost	$375
More information	http://www.precisionstrike.org/techsym.htm

Title	**Annual Systems Engineering Conference**
Description	The Conference will address all aspects of Defense programs including program management, systems and software engineering and effectiveness, best practices, education & training in systems engineering, the role of development test, modeling & simulation, net-centric operations and data/information interoperability, system-of-systems engineering, and all aspects of system sustainment and logistics.
Duration	4 days
Cost	$700-850
More information	http://www.ndia.org/Template.cfm?Section=Meetings_and_Events

Title	**Senior Software Summit**
Description	Purpose: build a strategy for software engineering, investment and resources
Duration	2 days

Title	**Defense Systems Acquisition Management Course**
Description	Meets the needs of defense industry acquisition managers in today's dynamic environment, providing the latest information related to policy, reform, initiatives, procedures, processes, PPBE process and Congressional budget process, and the relationship between capability needs determination, resource allocation, science and technology activities, and acquisition programs.
Duration	Classroom, 5 days
Cost	$1,690
More information	http://www.ndia.org/Template.cfm?Section=Meetings_and_Events

G-7 Air Force Conferences

Title	**Systems & Software Technology Conference**
Description	The conference is touted as the premier systems and software technology conference relating to the Department of Defense. The conference focuses on matching problems with solutions as representatives from industry, government, and academia present their ideas and solutions through tutorials and presentations.
Duration	4 days
More information	http://www.sstc-online.org/

Title	**Air Force Information Technology Conference**
Description	A Department of Defense-wide (DOD) event offering DOD employees the opportunity to hear industry and governmental keynote speakers, attend educational seminars, and join dialogues between IT vendors and fellow attendees
Duration	3 days
More information	http://afitc2007.gunter.af.mil/

G-8 Navy Conferences

Title	**Naval NETWAR FORCEnet Enterprise and Industry Conference**
Description	The conference joins the PEO for C4I and NETWARCOM with SPAWAR and the NDIA to share perspectives on how the Naval NETWAR FORCEnet Enterprise collectively enhances the delivery of network centric operations to the fleet and the Joint Warfighter.
Duration	2 days
Cost	$0 for Military and Government employees
More information	http://www.ndia-sd.org/industry_conference/2007/index.php

G-9 Army Conferences

Title	**Army Information Technology Conference**
Description	The conference brings together the most important and knowledgeable people driving the Army's present and future IT requirements.
Duration	4 days
Cost	$0 for Military and Government employees
More information	https://ascp.monmouth.army.mil/scp/index.jsp

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G-10 Professional Organizations

Title	**IEEE**
Description	A non-profit organization, IEEE is the world's leading professional association for the advancement of technology. Leading authority on areas from aerospace systems, computers and telecommunications to biomedical engineering, eclectic power and consumer electronics among others.
More information	http://www.ieee.org/portal/site

Title	**SEI**
Description	The SEI Membership program was established in 1992 to provide opportunities for members to advance, network, and learn. SEI members are leaders in software engineering and related disciplines and include CEOs, directors, and managers from both Fortune 500 companies and prominent government organizations. Many members have used their SEI membership to increase their professional standing and affiliations.
More information	http://www.sei.cmu.edu/membership/

Title	**The Society for Software Quality**
Description	The Society for Software Quality (SSQ) is a membership organization for those interested in promoting quality as a universal goal for software. The Society promotes increased knowledge and interest in the technology associated with the development and maintenance of quality software. Our charter is to advance the arts, sciences, and technologies of quality software and to nurture and promote professionalism in those who engage in these pursuits.
More information	http://www.ssq.org/

Title	**Association of Information Technology Professionals**
Description	AITP offers opportunities for Information Technology (IT) leadership and education through partnerships with industry, government and academia. AITP provides quality IT related education, information on relevant IT issues and forums for networking with experienced peers and other IT professionals
More information	http://www.aitp.org/index.jsp

Title	**Network Professional Association**
Description	The NPA is a self-regulating, non-profit association of network computing professionals that sets standards of technical expertise and professionalism. The mission of the Network Professional Association is to advance the Networking Industry towards a profession.
More information	http://www.npanet.org/

G-11 Other Private Industry & Academic Conferences

Title	**Software 2008**
Description	Explores the continued importance of innovation to the software industry.
Duration	2 days
More information	http://www.sandhill.com/conferences/sw2007/index.php

Title	**Embedded Systems Conference**
Description	World's largest international embedded event and technical conference.
Duration	3 days
More information	http://www.embedded.com/esc/sv/

Title	**International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering**
Description	Sponsored by IEEE, this conference provides a virtual forum for presentation and discussion of the state-of-the-art research on computers, information and system sciences and engineering.
Duration	3 days
More information	http://www.embedded.com/esc/sv/

Title	**IEEE AUTOTESTCON – The Systems Readiness Technology Conference**
Description	US largest conference focused on automatic test systems for US military systems.
Duration	4 days
More information	http://www.autotestcon.com/

G-12 Certifications & Credentialing Programs

Title	**The Certified Project Manager (CPM) Boot Camp and the IT Certified Project manager (ITCPM) Boot Camp**
Description	Where other project management programs focus on theory concepts and lecture, the CPM Boot Camp provides proven and practical project management and leadership tools and techniques taught in a unique and challenging experiential based immersion format. You will have the opportunity to develop, test and stretch your leadership skills in challenging and realistic project team situations.
Duration	5.5 days
Cost	$3,600-5,200
More information	http://www.pmlg.com/certified_project_manager_boot_camp.php

Title	**SEI-Certified PSP Developer**
Description	The SEI Personal Software Process (PSP) is a disciplined and structured approach to software development that can be applied to many different types of projects. A PSP Developer is an individual who can competently deliver quality software on predictable schedules.
Cost	Exam $250
More information	http://www.sei.cmu.edu/certification/index.html

Title	**SEI-Certified SCAMPI High Maturity Lead Appraiser**
Description	An SEI-Certified SCAMPI HM LA is responsible for applying this benchmark to determine that an organization has demonstrated the capability to manage its projects to product high quality, predictable results at CMMI Maturity levels 4 and 5. A SCAMPI HM LA will lead a trained team of professionals in the appraisal of one or more CMMI process areas to determine that organization's process capability and/or maturity level.
Cost	$2,000-10,000
More information	http://www.sei.cmu.edu/certification/index.html

Title	**SEI Software Engineering Process Management (SEPM) Certificate Programs**
Description	Organizations that want to remain competitive need to continuously improve their processes and products. If you plan to manage, lead, or participate in process improvement efforts at your organization, one of the four SEPM certificate programs offered by the SEI can help you develop the skills you need. The four SEPM certificate programs include: SEI Certificate in Software Engineering Process Management, SEI Certificate in Software Process Improvement Implementation, SEI Certificate in CMMI, and SEI Certificate in Personal Software Process for CMMI.
Cost	$2,000-10,000
More information	http://www.sei.cmu.edu/activities/credentials/programs.html

Title	**SEI Software Product Line Curriculum and Certificate Programs**
Description	This curriculum is based on extensive SEI and community experience in developing, acquiring, and fielding software product lines. The curriculum is supported by a widely acclaimed practitioner book in the SEI Addison-Wesley Series as well as leading-edge reports, case studies, and product line artifacts. The collection of five courses equips software professionals with state-of-the-art practices so they can efficiently use proven product line practices to achieve their strategic reuse and other business goals
Cost	$2,000-10,000
More information	http://www.sei.cmu.edu/activities/credentials/programs.html

Title	**SEI Software Architecture Certificate Programs**
Description	The SEI has developed three software architecture certificate programs to equip software professionals with state-of-the-art practices for designing, documenting, evaluating, and implementing software architectures.
Cost	$2,000-10,000
More information	http://www.sei.cmu.edu/activities/credentials/programs.html

[i] The list of SSE survey findings provided in this report is not a comprehensive list of findings. A subset relevant to the HR Focus Team charter is presented.